

In This Issue—*The Quincy, Ill., Used Car Exchange*

APR 21 1922

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MOTOR AGE

VOL. XLI
Number 16

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, APRIL 20, 1922

Thirty-five Cents a Copy
Three Dollars a Year

Are you displaying
this sign?

"Ask 'em to buy"—



DEALERS the country over are wiring and writing for the 1922 BOYCE MOTO-METER SERVICE STATION APPOINTMENT.

Under this new policy—authorized Service Stations may replace any BOYCE MOTO-METER which may have become damaged in any manner, with a brand new one at half price.

This new plan will make thousands of new BOYCE MOTO-METER boosters.

It is designed to bring BOYCE MOTO-METER owners to *your* store—giving you the opportunity of increasing your sales on *all* lines.

Write your regular jobber—or ourselves for complete details today. Tomorrow may be too late.

BOYCE MOTO-METER

"On the radiator cap of millions of cars"



The buyer's ideal car or truck is a genuine **SPECIALIZED** vehicle

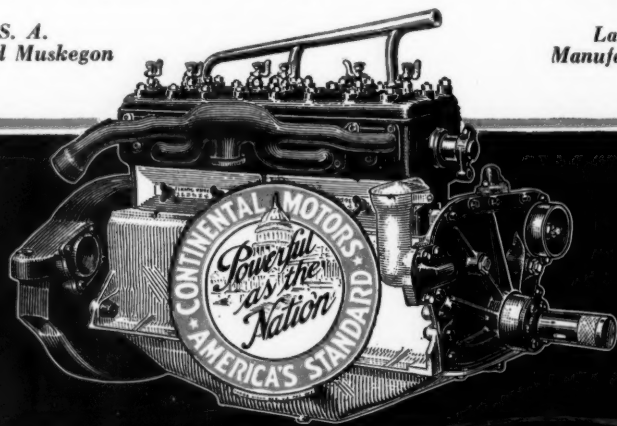
When the motorist or truck-user of today visualizes the type of car or truck that he would choose to build for his own use, he pictures a vehicle constructed of masterpiece units. Experience has taught him a definite lesson. It has convinced him that the ideal type of car or truck must be what a genuine **SPECIALIZED** vehicle is today; namely a vehicle built exclusively of *proven* units—a vehicle guaranteed by its builder, backed by the ability of the unit **SPECIALISTS** and adequately protected by parts-distributing stations that dot the world.

This foreshadows more than an increasing demand for **SPECIALIZED** vehicles. It means a corresponding increase in efficient servicing. For with genuine **SPECIALIZED** parts instantly available at parts-distributing stations, dealer service organizations can do *better* work in *less* time. It is, therefore, decidedly to the interest of these service organizations to further the sale of vehicles that embody the best **SPECIALIZED** units—such units, for instance, as the motor that bears on its crankcase that foremost symbol of **SPECIALIZATION**—the Continental Red Seal.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, U. S. A.
Factories: Detroit and Muskegon

Largest Exclusive Motor
Manufacturers in the World



Continental Motors

MOTOR AGE

Published Every Thursday by
THE CLASS JOURNAL COMPANY
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PATRIOT

Motor ★ ★
 ★ ★ Trucks

Just Load & Go

Farmers Want to Be Sold Patriots

The Automotive Merchant who looks to the farm market in 1922 for volume sales will not look in vain. The farmers are buying.

Patriot is the truck they want. The success Patriot farmer-owners have had, prove it the truck par excellence for the farm.

Low price, low operation cost, wide adaptability, and dependability that takes care of spring and autumn rush seasons without fail are what farmers ask. Patriot gives all this, and more.

Sell Patriots around your town under our liberal, stable contract. Become one of the most prosperous business men of your community. See that the letter is mailed today.

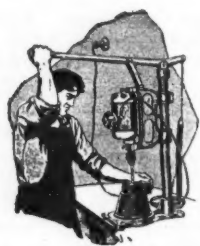
Patriot Mfg. Co.

HAVELOCK,
NEBRASKA.



ERNEST M. POLLARD, of Nehawka, Neb., says that he can handle twice the load on his Patriot that a 3900-lb. team can haul over the same going. And he is only one of many.

Jacobs *Quality* Chucks



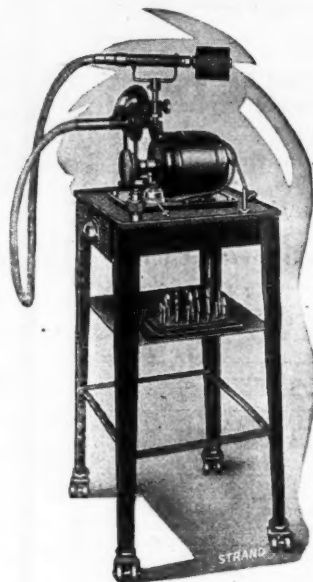
The
Business End
of Good
Drilling
Equipment

Strand Flexible Shafts

can be used to great advantage for

Grinding, Polishing, Scraping and
Drilling

Type
MP5



$\frac{1}{4}$ H. P.
Motor

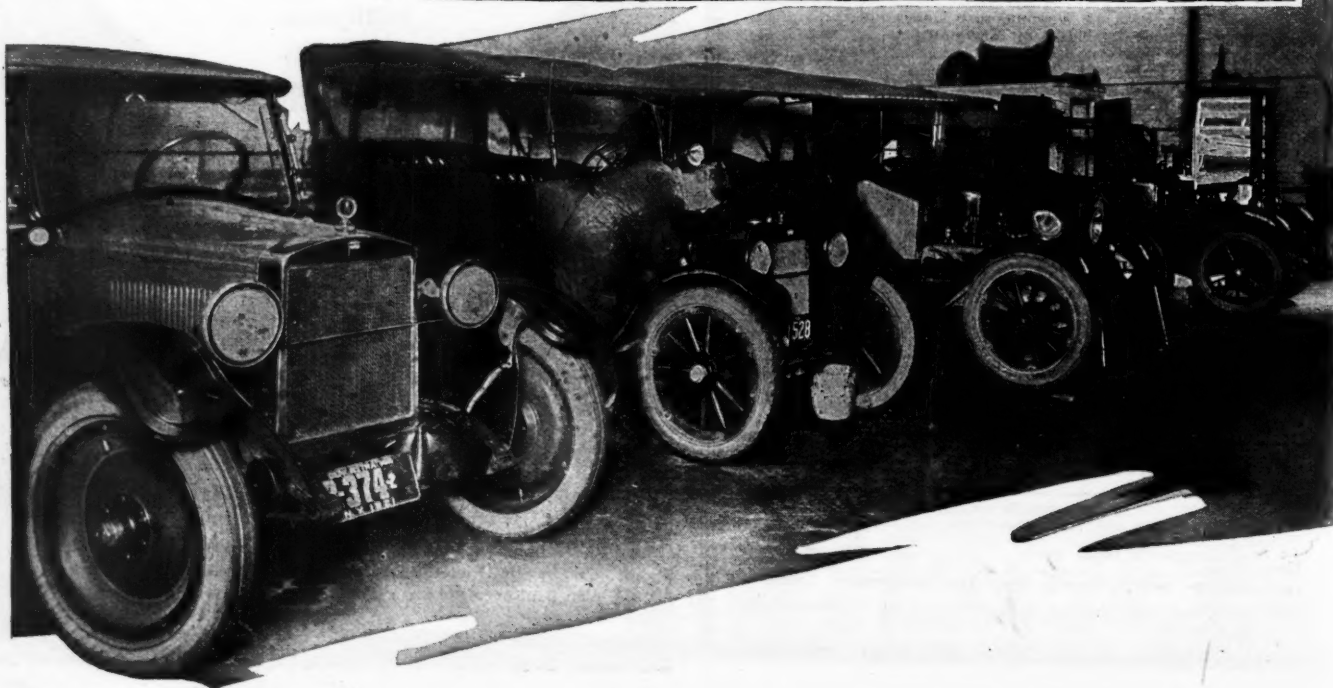
Manufactured by

N. A. Strand & Co.

Chicago, Ill.

General Sales Office
625 W. Jackson Blvd.

Designed by MACHINERY



MOTOR AGE

Used Car Problems Solved

This is the first article of a series of advertisements that are intended to acquaint the public with the USED CAR BUSINESS as it stands today.

To Begin With We Will Tell What
We Know About The

Quincy Auto Exchange Inc.

Following Are Names of Stockholders and New Car Dealers Who Are in This Concern for Your Interests.

Morris Adler Co.
Badaino Bros. Garage and Sales Co.
Bennett Garage and Machine Co.
Beatty Garage Co.
Cannon Ball Garage.
Clough Rehm Co.

H. A. Geise.
Gem City Motor Car Co.
Jefferson-Johnston Co.
R. Morrison.
North 12th St. Garage.
Oldsmobile Sales Co.

Overland Cars Co.
Parke Motor Co.
Pfanschmidt & Geisel.
Quincy Velle Co.
Vermont Street Garage.
Weems Motor Co.

The First Year of the Quincy Used Car Exchange

*This First Venture of a Group of Illinois Dealers Has
Proven Surprisingly Successful*

By CLYDE JENNINGS

AFTER a year of successful operation, the Quincy, Ill., Used Car Exchange and The Quincy Automobile Trades Association have some very definite opinions on the work necessary to make a success of this movement. Quincy has a population of more than 40,000. Some of these opinions can be stated here before going into the details of the operation.

The success of the year's operation is proved by the book value of the stock. A year ago the Exchange was organized without a dollar in cash and the stock payments consisted of used cars then on the floor of the

various dealers. These cars were pretty badly used and were appraised by a used car committee of the association. As each member of this committee was turning in cars on stock, it is natural that the valuations were not low. However, no one has ever said that they were not fair to all concerned.

With this beginning, the Exchange closes its first year with stock showing a book value of 70 cents on the dollar.

Also the Exchange closes the year with more Quincy dealers participating than at the beginning of the year.

These two items are regarded as proving the success of the first year.

Now as to the why of this success:

Bob Morrison, the manager, says the success of the Exchange is due to the fact that all problems concerning its operation have been threshed out by the dealers interested and that frequent meetings have been a help and the discussions have been frank enough for all participating dealers to air any grievance that they might have.

The dealers say that much of the success of the exchange has been due to the diplomacy of Morrison, who has been able to forget many things and who never gives up his effort to have all participating dealers fully understand the situation.

Back of both of these reasons the investigator cannot but realize that much of the success is due to the method of operation of the Quincy Automobile Trade Assn. The association is not afraid to tackle any subject that comes up and thresh it out to the end. The average of attendance is high at all meetings and frankness prevails.

After a year, all concerned in the Exchange agree on certain things:

First—That a bigger and better salesroom is needed.

Second—That a paint shop is necessary.

This conclusion is interesting, in that it grows out of the establishment of an upholstery and top shop. No dealer in Quincy was equipped for this work. The Exchange put in such a shop and offers to participating

dealers special terms for work. All are glad to send their work there. It is proposed to put in the paint shop on the same basis. Quincy dealers have never been satisfied with the trim and paint work done by the carriage shops that have previously done this work.

Third—That the plan of doing only the most rudimentary work in the Exchange is right and that the practice of sending cars requiring much work to the shop of the dealer in that car, or to the shop best equipped to do it and crediting this dealer with the cost of the work, is an excellent plan.

A year ago, when the exchange was organized, MOTOR AGE told something of the plans. Vital in these plans were that the majority of stock in the Exchange should always be owned by participating dealers and that the manager should be a stock owner but could not own more than one-third of the stock. It was expected at that time that the Exchange would organize a shop for overhaul work, but it has been found better to send this work back to such dealer shops as are equipped to do the work. Payment for this work is credited upon stock purchase until the dealer has paid his stock in full.

The Exchange is incorporated as a \$50,000 company and \$21,000 of the stock has been subscribed. In making out some reports at the end of the year, Morrison compiled a list of some of the cars turned in on the initial payment of stock. Here are the chief items of his stock in trade on opening day, with the committee valuation, Morrison's market valuation and his comment on the items:

Vehicle Offered—	Appraised Market	
	Value	Value
One 1914 Kissel Kar-6, closed body, just a little smaller than a house	\$ 250	\$ 90
One 1914 Little Six touring in bad condition.....	175	50
One 1917 Studebaker 6, seven passenger, in fair shape.....	450	150
One 1915 Packard 6, seven passenger, in fair shape.....	500	200
One 1915 King 8, touring, in very bad shape.....	250	75
One 1913 Hupmobile roadster, a complete wreck.....	100	25
One 1914 6-45 Hudson touring, in bad condition.....	300	75
One 1913 Chalmers touring, nearly worthless.....	125	30
One 1912 Reo touring, in bad condition.....	125	25
One 1918 Maxwell truck, a wreck.....	175	30
One 1915 Commerce truck, a wreck.....	168	20
One 1913 79-Overland truck, in bad condition.....	115	25
One 1917 Chevrolet roadster, in fair shape.....	345	150
One 1917 Chandler coupe, in fair shape.....	1000	400
One 1917 Studebaker, seven passenger.....	475	200
One 1912 E. M. F.....	75	15
One 1913 Studebaker roadster	125	20
One 1915 Metz touring	125	25
	\$4878	\$1555

Manager Morrison, who is at heart a trader, was not discouraged by this list. In his added comment he says: "To handle some of these cars at all it was necessary to begin a series of trades. In some cases it was necessary to make four trades before we turned the car into cash. The system is to trade a large car for a smaller and get what cash we can until we get down to the small car. At one time we had 35 cars on the floor, only 10 of which came direct from dealers."

Something has been done in the way of junking cars for the good parts, but this is not regarded as a large part of the business except as to the cars that are very popular in that neighborhood. Some stock of parts is being accumulated from cars that because of wrecks or similar causes are of no value for transportation.

As soon as the appraisal committee had completed its work of the valuation of cars offered for the initial payment on stock in the company, Morrison assumed the role of appraiser and to him are referred all cars to be taken in on trades by the dealer stockholders in the Exchange. These appraisals are based on the market value of the cars and are being closely followed by the dealers. The fear that the car buyers would get the idea that this was some sort of a "trust" or other business plan being held over their heads has not developed.

Morrison says that the acceptance of this plan by the public depends very largely upon the fairness and earnestness of the dealers in explaining it to the prospect. He outlined a talk for the dealers to make to the prospect and

NO. _____		QUINCY, ILL., _____		192 _____	
QUINCY AUTO EXCHANGE					
TO _____			DR. _____		
Value of Merchandise as divided below \$ _____					
Make of Car.....	Conditions of Payment.....				
Style of Car.....	Payable When Car is Sold.....				
Factory Number.....	When Taken Away If Not Sold.....				
Motor Number.....	Car Consigned For Sale.....				
License Number.....	Cars to left Days For Sale				
SEAL	Repairs and Storage to be paid if Car is not sold in				
Q. A. E.	Days or Renew Time Car to be left				
Formerly Owned By					
Address.....					
Appraised By.....					
Storage on Cars Left For Sale \$5.00 Per Month					

A receipt for the car is given to the dealer

he finds that dealers and salesmen are following the idea—not the words—and it is going across.

The talks to the prospect discuss very frankly the fact that bidding against each other for used cars almost brought the new car dealers to bankruptcy and they talk to the prospect about the impossibility of handling new and used cars in the same establishment. A paragraph from this prospectus of the talk to the prospect is as follows:

"We want you as a car buyer to realize that this feature of the automobile business is different from any other business. If you buy a suit of clothing, you do not expect to trade in your old suit as part payment, merely because it is a bit shabby or has a hole in it or is out of style. The jeweler does not take in your old watch when you buy a new one, except as junk."

In the early days of the exchange it was found that some dealers were inclined to hold out their very best used cars and sell them themselves. In other words, the idea that some held was to "slip the lemons" to the exchange and "save the velvet" for the house profit. This tendency did not become general and after a few cases had been reported, the question was brought up at a regular meeting of the exchange stockholders and the following agreement was adopted:

"We, the undersigned stockholders of the Quincy Auto Exchange, agree to pay to the Quincy Auto Exchange 10 per cent of the appraised value of every car we take in trade that we do not place with the Exchange for sale. Also we agree to have every car taken in trade appraised by the Exchange, or we will pay 15 per cent of the trade in value of the car to the Exchange.

QUINCY AUTO EXCHANGE

QUINCY, ILL., 1922

This is to certify that the following Automobile has been appraised for.....
And if presented this day to the Quincy Auto Exchange will be allowed a certificate for \$..... to be paid in numerical order.

DESCRIPTION OF AUTOMOBILE APPRAISED

Name of Car..... Model.....
Year..... Factory No.....
Motor No..... License No.....
Color..... Top.....
Curtains..... Upholstering.....
Radiators..... Tires R. F.....
Left F..... Right R.....
Left R..... Fenders R. F.....
Left F..... Left R.....
Right R..... Motor Condition.....
Pistons..... Compression.....
Clutch..... Transmission.....
Rear End..... Frame.....
Battery..... Starter.....
Spot Light..... Bumper.....
Shock Absorbers..... Extra Tire.....
Remarks.....
Name of Owner.....
Appraised by.....

Appraisal made on all cars offered to stockholder-dealers in trade. Appraisal subject to change after one day

CERTIFICATE OF INDEBTEDNESS

NO.

\$.....

QUINCY, ILLINOIS, 1921

THIS IS TO CERTIFY that on the above date....., of Quincy, Illinois, sold and delivered to the Quincy Auto Exchange, Inc., of the same place, one..... Automobile, a more detailed description of said car being hereinafter set out, the payment for which the said Quincy Auto Exchange, Inc., has issued this Certificate of Indebtedness to the said..... Dollars, (\$.....) payment to be made as herein provided, together with interest at the rate of..... per cent., payable semi-annually from.....

It is agreed by and between the parties hereto that this Certificate of Indebtedness, Number....., shall be paid off in its consecutive number, whenever there are funds on hand in the treasury of said Quincy Auto Exchange, Inc., and it is so ordered by the Board of Directors thereof.

DESCRIPTION OF CAR:

Make of Car..... Motor No.....
Factory No..... Style of Car.....

It is also agreed that the terms and provisions of this Certificate of Indebtedness shall be binding upon the parties hereto, upon acceptance hereof and the title to said car shall pass and belong to said Quincy Auto Exchange, Inc.

QUINCY AUTO EXCHANGE, INC.

By.....

I, or we, hereby accept the terms and provisions of the foregoing Certificate of Indebtedness.

The certificate of indebtedness replaces the receipt and is bankable

QUINCY AUTO EXCHANGE

QUINCY, ILL., 1922

Make.....
Car No.....
Motor No.....
Model.....
Color.....
Consigned From.....
Formerly Owned By.....
Address.....
First Cost of Car.....
Shop Labor.....
Parts.....
Battery.....
Top.....
Curtains.....
Tires.....
Paint.....
Gasoline and Oil.....
Commission.....
Total Cost.....
Remarks.....
Sale Amount.....
Cash Payment.....
Balance Due.....
Payable..... per month
with interest at..... per cent
Make of Car traded in.....
Car No..... Year..... Model.....
Sold to.....
Address.....
Date Sold.....

Record of car kept for business file

This agreement, or something like it, was found to be necessary to protect the exchange from becoming a junk shop. Since this question was discussed and all of the stockholders got the idea, the sailing has been much easier and the exchange is receiving some very good cars for sale—a thing that is necessary to give the proper mercantile standing to the Exchange.

Most of the sales made are on a time

payment basis and the manner of handling these sales is especially interesting. When a car is sent in by a stockholder, he is given a receipt for this vehicle. Then as rapidly as the time payment notes held by the exchange accumulate, the dealer receipt is taken up and he is given a "certificate of indebtedness" in its place. This certificate is backed up by the time payment notes accumulated by sales, and, of course, is bankable

when the banker approves of the security. The bankers of Quincy are strong supporters of the exchange system, as they would much prefer to be shown a series of secured certificates of indebtedness than a stock of used cars. These certificates are retired in order, as the notes are paid.

The exchange does not get the use of any of the money involved in these time sales but must make the money necessary for the operation on the cash sales.

Now as to the top and upholstery department. There was no worth-while department of this kind in Quincy, and the Exchange needed this work the worst way. So a shop was opened. The stockholders of the exchange were impressed with the fact that this was their shop and to them must come the profits. Also a special sales percentage was allowed for dealers who sent business to the shop. The work of this shop has been of great sales value to the Exchange, as otherwise unsaleable cars were put in good shape for the market. Also the exchange has picked up considerable custom work. A fire in a neighboring town recently sent 20 cars into this shop for major work and served very well to fill the often idle time in late winter.

Now the exchange is planning a paint shop and the dealers are looking forward to the establishment of this shop when they will be able to handle their own business without resort to the old-time carriage builders.

The exchange does not sell anything or do any repair work that conflicts with the business of any of the stockholders and in this way keeps entirely out of competition.

The following is a financial statement that was submitted to the stockholders by Manager Morrison Jan. 1 this year, after nine months operation:

QUINCY AUTO EXCHANGE, INCORPORATED

Statement, Jan. 1, 1922

ASSETS	
1—Petty fund.....	\$ 989.41
2—Certificate redemption fund	185.98
3—Accounts receivable	343.30
4—Notes receivable	7296.28
5—Bills receivable	236.06
10—Autos & Trucks.....	8608.89
11—Repairs and parts.....	2219.43
13—Gasoline and oil.....	19.50
14—Office equipment & furniture	258.60
17—Garage equipment & tools	730.85
40—Profit and loss.....	4734.38
Total assets.....	\$25,621.68
LIABILITIES	
25—Capital stock	\$50,000.00
31—Certificates payable	6175.00
31—Car receipts payable	3600.00
30—Bills payable.....	318.68
Reduction of liabilities	
26—Unsubscribed stock	34,472.00
Total Liabilities.....	\$25,621.68

January 1, 1922, invoice stock Quincy Auto Exchange worth \$70.

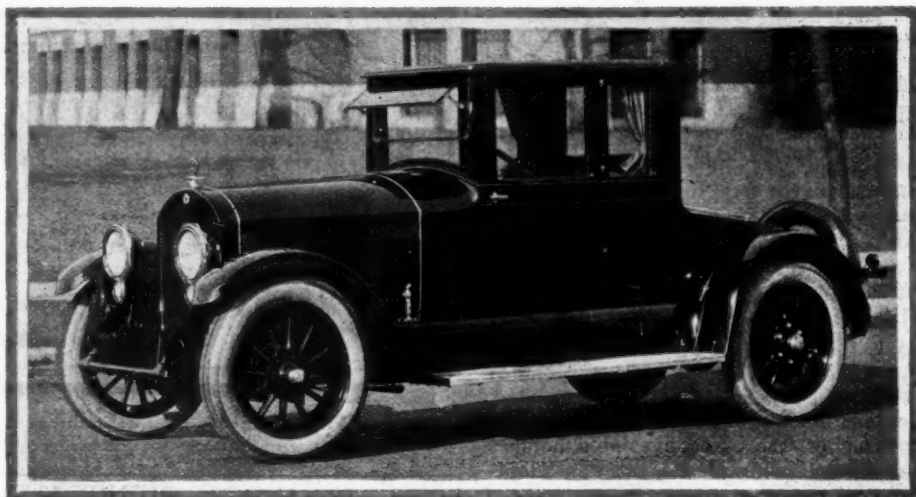
In conclusion, it is interesting to note

that this company was established without a single dollar of cash being paid into the treasury and it has at all times been able to meet all of its obligations. During the first 10 months the exchange sold 184 cars. The exchange appraiser passed on 469 cars, not all of which, of course, were traded in. A good many owners decided to drive their cars a few months longer when their dream of an even, or perhaps a profitable trade to themselves for a new car was dispelled.

Ninety per cent of the cars sold were disposed of on terms. The maximum

term allowed has been eight months, with interest on payments at seven per cent.

It was not the expectation of the stockholders in the Exchange that they would make a profit from the stock they held in this company, but rather that it would relieve them from the worries in connection with handling their trade-in cars. This business did not seem to fit into their new car business and few of them had sufficient turnover in used cars to justify the organization of a used car department.



Cole Model Eight-Ninety Two Passenger Coupe

THIS model is the latest body type to be added to the Cole line and is designed to fill a distinct need. It is a two passenger coupe with ample room for two unusually large people.

Standard color is Cole Blue with black body panels, sheet metal parts and chassis. Upholstering is either gray hand-buffed Spanish leather or gray cloth. There is a large luggage compartment in the rear deck and one on the right side. Nickel body bars are standard.

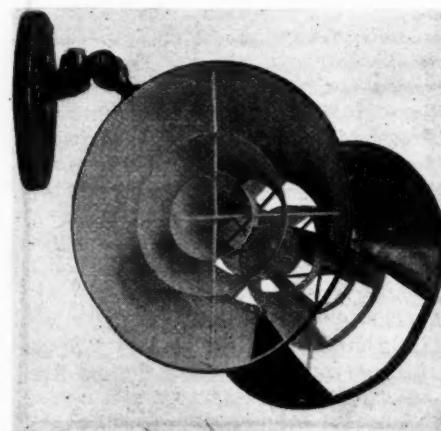
Township Will Light All Its Highways

THE Township of Amherst, N. Y., has decided to illuminate all the highways within its borders, and has entered into a contract with the Buffalo General Electric Co. for a lighting system for its entire road mileage, a total of about 100 miles.

The G-E Novalux highway lighting unit will be employed. This unit has a parabolic nest reflector and embodies certain new features for collecting light rays and directing them where most needed. Briefly described, it consists of two nests of three reflectors each, with a Mazda lamp mounted in the center, and the filament at the focal point of both sets. By this arrangement the greater part of the light that otherwise

would be lost by reflection upward and outward to the adjoining fields, is collected and cast in both directions on the surface of the roadway. The rays that would escape if only one reflector were used are picked up by the inner reflectors and directed toward the roadway at an angle of 10 degrees below the horizontal. A single parabolic reflector would have to be approximately 15 feet in diameter to give the same effect. The white reflecting surfaces of the unit reduce the glare.

The units will be placed every 400 ft., 30 ft. above the surface of the highway and about 20 ft. back from the shoulder of the road.



G. E. Novalux highway lighting unit consists of two nests of three reflectors which prevent waste of light

How NOT to SELL Automobiles

Just some stories from the buyer's standpoint that recently have reached members of the MOTOR AGE staff

THE following story, which is probably the best negative story we have heard in a long time, was told by a business man at an informal gathering where several persons met in the house of a common friend. All were strangers except the host, and as no special voucher was needed for any guest, the teller of the story did not know that any person present was interested in automobile sales. The story is told as nearly as possible as he told it:

---:---:---

I WAS recently assigned a desk job after many years on the road and concluded that I would quit taxi-cabs and ride in my own car. I had never owned a car and had never driven one. I know practically nothing about cars and so looked at several in front of the apartment house one morning, liked the looks of one of them, got the address of the agent out of a telephone directory and went there.

After I had announced my intent to buy, the young man who met me began asking questions. The third question was "Have you an old car to turn in?" I did not have.

Then he asked three or four more questions and then "Do you want to pay cash or buy this car on terms." I wanted to pay cash.

He questioned me for probably 20 minutes, then he said: "If you haven't an old car to trade in and want to pay cash, we want to stay close to you, for you are the first customer of that kind that has been in this salesroom for nine months."

I thought that was a queer way to talk to me about my prospective purchase, but I was still ready to buy then and there and was ready to sign anything he offered me, including a check, but he did not ask me to buy. After the remarkable statement about wanting to stay close to me, he asked about another date when he could see me. No one said anything to me about taking a ride in a car, nor very much about how it was made or why. Chiefly I seemed to be a curiosity. I did not meet any one at the salesroom except the boy who talked to me.

Finally I got tired and went out and nearby I saw another car in a window that I liked the looks of and I went in there. Here also I was questioned somewhat about who I was and what I

wanted with the car, but after while they appeared to be satisfied with me, took me for a ride in the car and I bought one. By some little perseverance I have learned how to run the car and like it very much, but I could not help wondering if the automobile demand was so great that the industry was again refusing sales. I have since learned that there are companies that are anxious to sell.

---:---:---

IT might be added that neither of the companies this man referred to are prosperous. One of them is in the hands of a creditor's committee, or some such arrangement, and the other is not well represented by cars in the street. In the city where this incident took place, neither car is sold in great volume—as any live dealer will probably realize.

---:---:---

HERE is another story of "big city" sales tactics. A man who is quite actively interested in motor affairs recently became possessed of a car that is not quite as high class a car as he wanted. So he decided to trade in this car on a high priced one. He selected eight cars of the class that he wanted

It Might Happen to You

A GOOD many articles have been printed from time to time on how to sell cars, so this one is somewhat different. Every dealer who has a right to be selling cars will see the faults in the instances given here.

These are printed because they are incidents that have happened this year and they are likely to happen in any sales force where the proprietor is not keeping in touch with what is going on. There are scores of excellent salesmen in this business, but there are some who never will be salesmen. Find out which is which in your business.

and on Sunday evening mailed letters to the local representatives stating exactly what he had in mind and telling the truth about his car.

Monday before noon four of these sales agents had responded to his letter by 'phone and had made dates for salesmen to see him. By Tuesday noon these interviews were cleared up and the man had a verbal offer from two and a promise of a letter stating the exact

terms of a proposed trade from two others. Wednesday morning these letters were at hand. On Tuesday, an inspector from one of the companies borrowed his keys and went to his garage to see the car offered in trade. The other three took his commercial standing as being a guarantee for his description of the car, merely making their offers subject to an examination of his used car. The company making the best offer, added that they would allow him this sum on his car but that they would put the car in their used car salesroom and make an effort to sell it at a higher price. If it brought a higher price, his account would be credited with the increased sum.

The chief point to this story is that the other four had not responded in any way in the week following. It also is worthy of notice that the four cars responded are big production jobs and the four that did not respond are not, but want to be.

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A MAN who had never driven any kind of an automobile recently bought a popular make of car, and the sale was conducted in the best possible sales style, according to this man and he is a salesman himself—but not automotive. Then came a hitch:

The company could not deliver the kind of a car that he wanted the day the sale was concluded. The salesman promised to have the car ready by Sunday and it was. The buyer found it when he went to the garage on the back of his lot Sunday morning. He had not been notified. A friend happened along and found him looking at the car and wondering how he could use it that day. The friend looked it over, found that it had some gasoline and oil in it and started it. He drove it to the salesroom and found there the salesman with whom the new owner had dealt. The owner and his friend received the impression from this salesman that he was through with this car and did not relish being called upon further.

In answer to questions he referred the owner to the parts department for an instruction book, said that he did not know how much oil was in the car and demonstrated that he did not know how to find out, admitted that he did not know the radiator capacity. As a result, this owner drove to an independent maintenance station to get the information.

Making Maintenance Pay on Limited Volume

What the Small Town Dealer Can Learn From the Hudson-Frampton Method of Selling Maintenance

By B. M. IKERT

THE underlying principles of selling motor car maintenance are the same in a large or small institution.

The man in a small town who buys a certain make of car expects pretty much the same performance from that car as the man in a large city who buys a similar car.

The dealer in the small town who would succeed in intelligently and profitably selling his maintenance work can take many a valuable hint from a big city dealer's maintenance department.

Volume is about the only thing wherein the job of selling maintenance varies with the size of the town or institution. There are exceptions to this. It is possible to go into some small towns and find maintenance departments so completely tooled up for the work that they draw trade from a whole county, while another and larger institution in a big city pretending to service a certain make car may go begging for work.

Theoretically at least, we expect to find the large city dealer's maintenance department run on a much more efficient basis than his fellow dealer's which is located in a smaller community. The dealer in the large city generally can afford to do things which are out of the question with the small town dealer.

After we have drawn all comparisons and contrasted the large city and small city dealers' maintenance departments we find several things which they have in common.

Perhaps we should say it this way. After studying the methods which have proven successful to the maintenance departments of dealers operating in large cities, we find there are some of these things applicable to the small town dealer's business.

Thus if we find that a certain dealer's maintenance department in Chicago, say, is operated on a clean and orderly basis, is it not logical to assume that a similar department operated by a small town dealer can be clean and orderly? There

is no excuse for dirt or disorder, be the business large or small. The big dealer may have a porter on the premises who looks after the floors and windows, while the small town dealer may have one of his mechanics, knock off an hour earlier some day to do this work.

It would seem that every small town dealer who read the story of the Hudson-Frampton maintenance department in last week's issue of *MOTOR AGE* can pick out a half dozen or more things mentioned in the story and apply them wholly or in part to his own business.

Before attempting to do this, it is well to consider the divisions of maintenance. In other words we must assume that every dealer's maintenance department, large or small, is made up of so many departments. Some of these may be contained within another department, but they exist in the business just the same.

As we said a few weeks ago it is possible to divide the maintenance department of every dealer's organization into seven distinct departments. These may go under different names with different establishments, but they will exist in some form nevertheless. The seven departments are:

- 1—Maintenance Sales
- 2—Quick Service
- 3—Main Repair Shop
- 4—Parts Department
- 5—Finished Work Storage
- 6—Delivery Department
- 7—Accounting Department

Maybe you, as a dealer, are not aware that you have all these departments in your business, but we defy anyone to tell us that any one of these departments can be left out of an organization which purports the selling of maintenance on motor cars.

You have a maintenance sales department, although you may not have a room set aside for this. It may not be a department, as we are accustomed to think of a parts department or a shop. The selling department is intangible. It's that division of your business where you come into contact with your customers. If you rely on one man to take care of the owners who drive in then

that one man is the maintenance sales department.

But there is more to this department. When the car owner is talked to over the telephone about some work he wishes done at your place of business, whoever talks to him becomes a part of that selling department. It may be the dealer, the service manager, a mechanic, the telephone operator or anyone else. It is selling your maintenance and look at it as you will you cannot get away from the fact that you have not a selling department in your business. Something sells your business, because if it doesn't you cannot long remain in it and make it pay. You may say "Our service sells itself." Very well. Maybe it does. But ten to one you have done something and are doing something to make it do so. Maybe it is the washing and polishing free of charge of every car on which the repair job runs over \$25. Maybe its the courteous attention afforded customers, or your flat rate system of selling the work, the proper delivery of the work to the customer, or something else.

The Quick Service Department

You have one, because how often has a man driven his car into your maintenance department and asked to have a certain job done quickly? You may have to take one or two men off a job and put them on this job. You get the customer on his way as quickly as possible. He has been in your quick service department, although he and you may not realize that your establishment has such a department.

Then there's the main repair shop. Such a department is obvious. Where maintenance work on motor vehicles is performed a shop is essential. Even in the smaller organizations there is one corner of the building or a section of it reserved for the "shop."

Parts Department

As long as parts become worn or break on motor vehicles they must be replaced and it obviously becomes necessary to stock them. The large maintenance department may boast of a large parts department wherein the stock runs into many thousands of dollars. On the other

hand, the small institution where the drain on the parts department is not so heavy there will be a proportionately smaller section of the building devoted to the parts.

Next comes the finished work storage. There is such a department in every maintenance division of motor car dealers. Some institutions have an adjacent lot where they store the finished cars until the customers call for them. Others have a part of their building set aside for the purpose. The small institution may have to run some of the cars out on the curb for a time, or leave them in the shop when they are finished. If every owner could arrive at the building at just the time his car was finished, of course, there would be little need for a place to put the cars, but with present methods some place is necessary.

Accounting for Small Shop

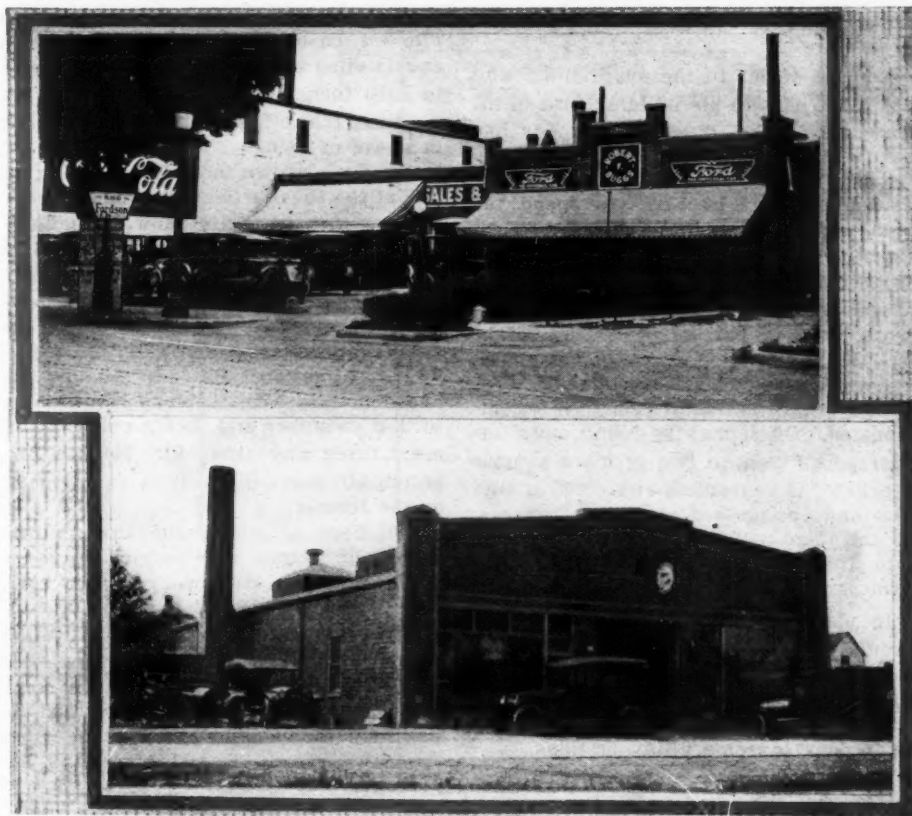
The delivery department possibly may be hooked up with the one mentioned in the preceding paragraph, but it also becomes a part of the maintenance selling department. The delivery department is simply that phase of the business where the process of turning over the car to the owner takes place. It involves his inspection of the job if this is possible, the presentation of the bill to him and his payment for the work. It involves the making sure that there is no grease on the steering wheel or control levers. In short, it is simply the way you handle your customers when they come in to get their cars.

Finally there is the accounting department. Unless you keep books, how do you know whether or not you are making money? The small shop which is not as yet well organized may do its book-keeping on a pad of paper, but for sake of argument we must consider it here as its "accounting department."

In some of the larger maintenance divisions the accounting departments are quite involved and command considerable respect. The clerical end of the business of selling maintenance is of vast importance because it is here that the curves can be plotted to show the course being taken. Of what avail is it if your shop has some of the finest equipment in the world, if the accounting department shows a loss on the books right along.

It is in the accounting department where all routine in connection with figuring and revising flat rate charges is handled. It is there that the time slips of the mechanics are figured. The history cards of cars made out, correspondence and advertising matter sent out and the dozen and one other things attended to which must necessarily be associated with the management of any well established maintenance department.

Up to this point we believe we have sold the reader on the fact that the selling of maintenance involves the establishment of the seven departments just referred to. All of these departments are well established in the Hudson-Frampton



The upper picture shows how one dealer has utilized the space in front of his building to handle quick service jobs. There may be some objection to putting this kind of work in your "front yard" but if it results in making maintenance pay, we feel like saying "more power to you." Below is shown a building which has adjacent a lot on which the dealer is displaying used cars. Such a lot easily can be converted into a quick service yard, if local conditions warrant

organization, whose method of selling maintenance was described in last week's issue. Before we take up the discussion of these departments with a view towards their application to the small town dealer, it probably would be well to pause for a moment and go into a few generalities about the organization.

The Building

The structure which houses the Hudson-Frampton company would probably not take a prize so far as architectural beauty is concerned. It was not put up for that purpose. But it easily could take a prize for being laid out to facilitate the work done in it.

There is the "yard," for example. How many small town dealers there must be, whose maintenance departments have adjacent a vacant lot. We have seen such buildings and the owners have told us that they also own the lot next door and some day "hope to build on it." Why wait to build? Certainly the lot or yard of Hudson-Frampton is one of the handiest things around the whole establishment. Likewise, the small town dealer who has access to a lot can cash in on it.

During the summer months a lot is doubly valuable because it makes it possible for tourists to drive in easily and have their wants attended to. All emergency service and quick service work can be done in the yard. Finished cars

can be stored there and should the shop be full any cars to be worked upon temporarily can be placed there.

Hundreds of dealers have told us that their building is too small and that they would like to add another story to it, all of which would cost considerable money. Yet these same dealers may have a vacant lot next to their building and could by a little outlay in money build a service yard which would prove a profitable investment. Air and water stations could be located in the center and a sign (big enough for tourists to see from the road) placed there to attract trade. This would keep the cars away from the curb. Also many motorists do not like to drive into a dealer's place of business just to get water or air. By getting them into the yard, an attendant might casually ask them a few things about the car and the chances are the tourist would buy a spare tube, or have his springs greased or something else.

We cannot possibly hope in an article of this kind to point out exactly how the small dealer can apply the things set forth in the Hudson-Frampton article of last week. No two buildings are laid out the same and no two lots will be of the same shape. In fact the shape of the lot, we believe, has little to do with the efficiency of it, so long as it is not triangular or some other odd shape that would be difficult to plan

properly for efficient handling of the work.

Let the dealer in the small town who has a lot next to his building first of all lease such a lot, unless he already has purchased it. Then let him clean it up. Get all the rubbish out of it and fill the depressions. If he cares to spend the money, it is an excellent plan to cement the yard to avoid mud in rainy weather. Cement keeps the cars much cleaner and, of course, makes a better footing for jacks, etc. A portion of the lot might well be roofed over and a bench placed underneath it. This bench should be of such a length as might easily be accommodated. Or, it may be found more advantageous to have two or more shorter benches. If convenient run electric current and compressed air to the benches, so the men will not be required to go into the main shop every time these items are needed.

In planning the entrance and exit, it should be done so far as possible so that cars do not enter or depart by the same gate. It is better to keep cars moving in one direction, if space is limited, just as is done in some filling stations.

If the air and water connections are placed near the center of the yard it helps to keep the sides free for parking cars. The plan view of the Hudson-Frampton yard in last week's issue shows an ideal arrangement as to entrance, exit, emergency service, water, air, etc. It would be well to follow the general arrangement, so far as possible.

Courtesy

In connection with the Hudson-Frampton article last week we said, "While we have indicated that this place is about as efficiently laid out as can be, has good equipment, good personnel, etc., it has above all, that subtle something in its atmosphere which makes you feel at home; makes you have confidence in the work turned out. Customers are treated as guests. Courtesy is one of the outstanding features, and yet it is not overdone."

This "subtle something" which makes you feel at home by the way, is a thing which certainly every institution can foster. There is no need for discourtesy in the small institution, just because it cannot have as elaborate a personnel as the large institution to greet customers.

While the larger organization may have one man who does nothing but talk with each customer as he comes, the smaller institution might have to double up a little. This man is also the inspector, or he may be the shop foreman. At any rate, there should be someone who can catch the customer the moment he drives in. If this man is busy with another customer, he easily can excuse himself and if he sees the new arrival getting impatient, go and explain to him that his wants will be taken care of in a few minutes. There is delay even in the best of regulated businesses.

One difficulty has been that we have allowed customers to come driving in and rushing around looking for someone to help them out of their difficulty, not realizing that other customers have come in ahead of them.

We have grown used to standing in line at the theater ticket box office awaiting our turn at the window. The business man stands for several minutes in line at the bank awaiting his turn at the window, and so on. Yet this same business man rushes in like mad into the maintenance station and yells for "service" or attention. He may see one car ahead of him with the inspector talking to that customer and then he cries about not getting any attention. He has forgotten all about his waiting at the bank or the theater.

But here is where the little subtle something comes in. Service Manager Hoffner of the Hudson-Frampton company has a trait which it would be well for the manager of a smaller institution to cultivate. If Hoffner is talking with a customer and he sees another car come in he lets the new arrival know that he has seen him and by the look he gives the new arrival the latter gets the impression that Hoffner is saying "I will be with you in just a minute."

In the small institution the mistake is often made in that the inspector or the foreman or mechanic, whoever might be the one to meet the public, is under a car, or talking with another customer and utterly ignores new arrivals. Courtesy in the selling of maintenance means using discretion. If there are one or two customers in the place and a doctor drives in his car, the chances are he wants to get out as quickly as possible. Maybe he is on his way to a patient.

Now the other customers may be some to whom a few extra minutes delay may not mean much. Then the thing for the man selling the maintenance is to excuse himself for a moment and ascertain the doctor's trouble. May be it will prove that he is not in a great hurry and says "go ahead with the other customers first." At any rate, you have given him service and yet have not jeopardized the good will of the others.

Courtesy is far more possible in the smaller institution, because it is easier to get to know each customer personally. You get to know their hobbies. The golf enthusiast likes to talk about his game, the fisherman about the way the small mouthed bass are biting these days, etc. Lucky indeed is the service manager or salesman who gets to know the hobbies of his customers. It will help him out immensely. Hoffner, of the Hudson-Frampton company, says it is one of the biggest essentials in the business and he plays it for all it is worth.

Best of all it is something which can be applied to the small institution without spending a cent. There may be something to the argument of the small dealer in saying his institution cannot afford all the labor saving equipment on

the market, but to say it cannot afford to cultivate courtesy and friendship is nothing short of disastrous.

Since we have spoken in general about the building layout and courteous treatment afforded customers, it follows that we should take up the seven departments of maintenance and see what phases of the business as applied to Hudson-Frampton can be equally or partially applied to the business of the dealer operating in a small community. We are assuming that the reader understands fully that the selling of maintenance, while fundamentally the same regardless of the size of the town or community, does not mean that each institution can be operated on identically the same lines as another. The make of car handled, its price, the volume of business, potential sales, etc., all are influencing factors.

Maintenance Sales

We already have said considerable about this in preceding paragraphs. The layout of the yard, courtesy, etc., are important factors in the selling of maintenance.

In last week's article we stated that you never hear a customer growing about his bill at the Hudson-Frampton company. There it was said that you hear no one cursing the place. The work has been sold understandingly. The small institution can sell its work just as understandingly.

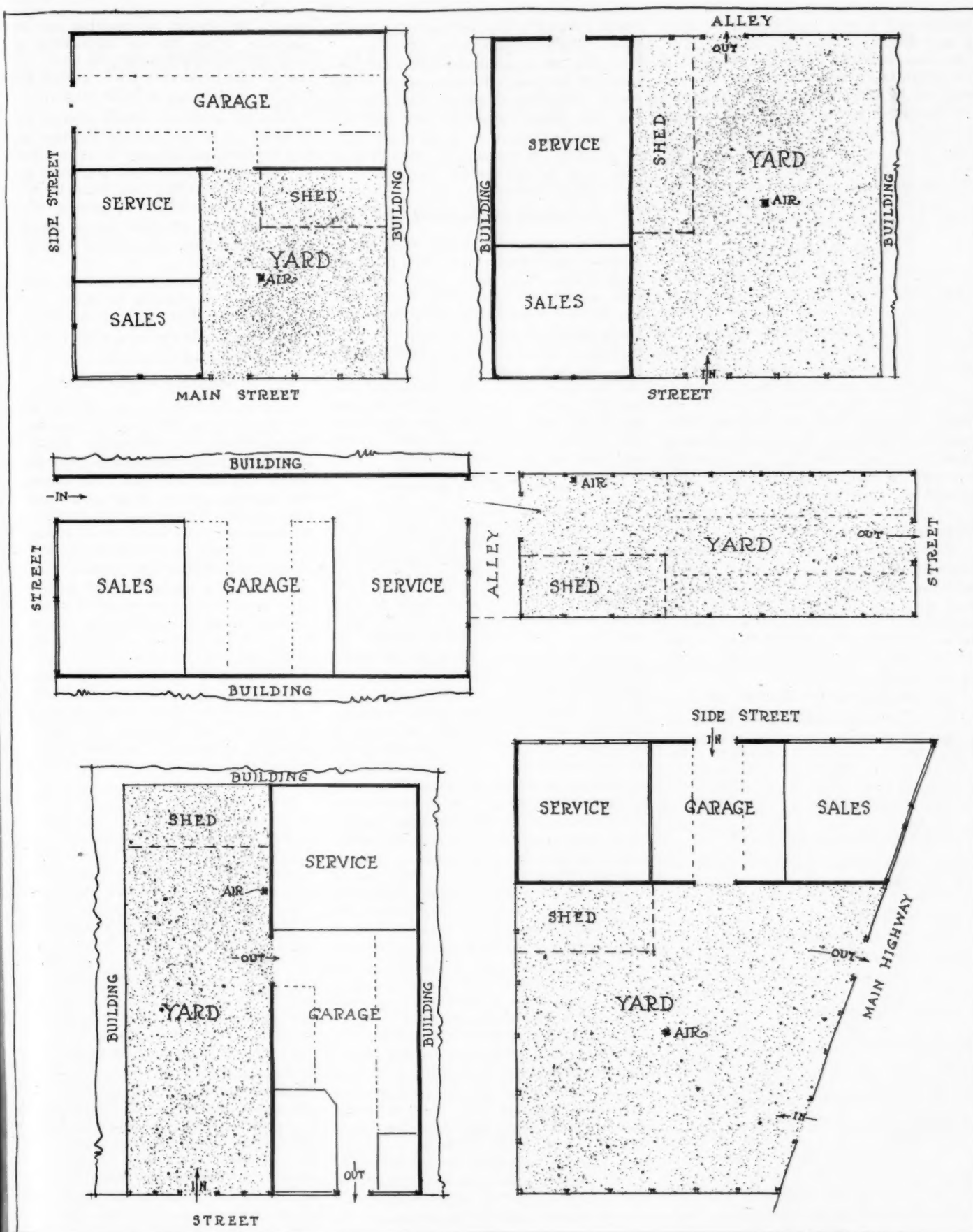
Not a job is touched in the Hudson-Frampton company until the customer has signed for the work and knows exactly what is going to be done to his car. Furthermore, he knows just what the job is going to cost him. There seems little excuse for the smaller institution not being able to handle its maintenance in the same way. The trick is to have a competent man to meet the public. This man should be a good trouble shooter and kept as such.

Don't let him work on cars altogether, although he may be good mechanic. Let him be shop foreman, if necessary, in connection with his work of trouble shooting. Above all else, he should be a good salesman, in the sense that he will take well with customers, sell them right and at the same time look out for the welfare of the institution he is working for. He must help his organization to make money, but he also must make friends for it.

Quick Service

The foregoing brings us to the department of quick service or emergency service. If a man drives in his car with a fouled spark plug, why tell him you will be able to go after his car in about two hours, and if he will come back then, you will have it ready for him? He may be on his way to town and hate to leave the car when there is but a trifling thing wrong.

Now suppose you have a yard and he drives in. The inspector locates the



Some Suggestions for Adding a Yard to Your Place of Business

The building layout and position of yard will determine how efficiently it can be laid out for quick service work. In some cases it will be necessary to have the customer drive through the building to get out, but this is advantageous in that it offers an opportunity for selling accessories, etc. The six plans shown here take in six different conditions as to building location, size of lot, etc., and we believe the dealer can, from the suggestions given, find one that will come close to his local conditions. Quick service yards have proven beneficial to so many dealers, that we believe they should be used wherever possible.

trouble and a man immediately puts in a new plug or cleans the old one. The customer may be under way again in ten minutes or less. And you can rest assured he likes this sort of treatment. No one likes to be deprived of the use of their car any longer than necessary. The quick service department must exist in every institution and especially during the summer months when a lot of tourist trade must be sandwiched in with the regular run of work.

Main Repair Shop

The lesson which the smaller dealer can learn from the Hudson-Frampton company in regards to its main repair shop is the departmentization idea. This means that one man will be especially suited to engine work, another to electric work, and so on. In these days it is hard to find an all around man in the shop who can do work of many sorts equally well. If you have such a man, in heaven's name make him the inspector, foreman, service manager or something else, don't bury him in the shop doing a job which he can easily train another man to do sooner or later.

It is possible to learn a lot from the efficient way in which the shop of this St. Louis maintenance organization is laid out. Let each man have his own bench and provide plenty of drawer space for him. Also let him have a vise of his own. It is false economy to try to economize on equipment.

The small shop will find it advantageous to plan its methods of operation along the lines of the Hudson-Frampton shop. While a number of mechanics (depending on the volume of work handled) is essential we believe the plan which seems to be working out best is that of having one man who is essentially a machinist. He does not have to know anything about tuning engines or adjusting carbureters, but must know all the essentials of handling a lathe, drill press, shaper, grinders, etc.

Then all the jobs which require machine work or careful fitting can be done by him, while the other mechanics simply confine their efforts to tearing down and reassembling, tuning, adjusting, etc. Machine work is pretty much the same on the parts of a motor car as it is on any other piece of machinery and consequently a good machinist will adapt himself more readily to the work, than a mechanic can adapt himself to the machinist craft.

One of the outstanding features of the Hudson-Frampton shop and which can be the outstanding feature of any shop for that matter, is the cleanliness. Men do better work and there is better morale in a place that is kept clean and orderly. If a big organization finds it worth while to keep the spirits of the men up by providing plenty of light, keeping the floors clean, ventilating so that exhaust gases are kept out of the shop as much as possible and do other

things along this line, certainly the small shop can profit thereby.

It does not take much capital to provide for keeping oil cans, waste, scrap metal, and such things off the floor. A few well made cupboards will hide all of them and what is more there will be a place for everything. It will take less time to find things and there is less chance for loss.

Parts Department

Every organization which sells maintenance must have some sort of parts department. The small dealer will not have a very extensive parts department but he must stock those things for which there seems to be the greatest number of calls. The factory, of course, looks into this very often and the policies of the factories vary. The perpetual inventory card is of great value in keeping the stock room record. This card system is known probably as well as any and need not be discussed here.

Finished Work Storage

Here again we come back to the selling of maintenance and the yard. What do you do with cars when your men have finished working on them? Maybe they are parked just where they have been standing in the shop while being worked upon, or maybe they are shunted around into some other part of the building.

Most small dealers have not the room to devote to the storing of finished cars and must get along as best they can. This is where the yard comes in handy and the only thing we can say here is to repeat that it is very advantageous to run the finished cars out into the yard.

If there is one thing which the small dealer's maintenance department can learn from the Hudson-Frampton company, it is that of making the car ready for turning over to the customer. Every job is inspected before the car is set aside and then an attendant cleans it. The steering wheel is wiped clean and everything else done to make it appear as though the car had not been worked on. There are no grease marks on the fenders or hood, nor stains on the floor board caused by a mechanic's careless step into a pool of grease.

In the small institution, the inspector may also have to do some of the cleaning up of the car, but very often it is possible for the dealer to get the services of a boy for this class of work. But the final inspection of the job should not be left to the boy. The service manager, or his assistant, should attend to this. He must serve in the capacity of the customer and if the job does not please him certainly it will not please the customer.

Delivery of Work

This really goes hand in hand with the storage of the finished work. When the customer comes in for his car there are certain things which must be done before all transactions can be considered

closed. It should be possible for the customer to get his car at exactly the time he was told it would be ready, unless he has previously been notified that the job would run a little longer.

Then the customer should also be able to step up to the cashier window and pay his bill, and because all of the items on the bill will have been put down previously he will know just what he must pay. It is a mistake to have to make him wait until the bookkeeper can find shop requisitions, and similar things to add up the bill.

The delivery of the work will take in the tagging of the car to show that it has been inspected and passed. The tag immediately tells the owner that his car is ready for him.

Accounting Department

Last week we told of the efficient manner in which the records are kept in the Hudson-Frampton company. There is much in this department which the small dealer can take to heart. For example, the handling of the shop orders can be done exactly the same in the smaller establishments. Only three forms are needed. The shop order, which is the envelope, the inspection report and the requisition for parts. All of these are kept in the envelope which is filed according to shop number and which is further cross-indexed with the owner's name.

The filing of shop orders is valuable to the small institution just as it is to the larger, because it makes it possible to refer to the order at any time. It prevents come-backs, because every detail of the transaction at that time are enclosed in the envelope.

Then there is the history card. There is no reason in the world why this idea cannot be applied to the smallest establishment. The trouble has been that this has not been done in the smaller institution. How many small dealers can tell you now exactly the number of times a certain man's car has been in for repairs, even though they sold this man the car? How many can tell the history of these cars they have sold? They may think that so and so is a steady customer, when in reality he has been in only a few times, from which they have gained the wrong impression. The history card tells all and one of the first things we should do is to apply it to the small institution. From these cards many valuable charts can be plotted and the trend of the business ascertained. It is possible, from them, to figure flat rate prices for certain operations, especially where these cards extend over quite a period.

The cards tell how many miles a man's car has been driven and are essential in sending literature to him, telling him that he was in the maintenance department on a certain date and that it probably is time for him to come in again to have the valves ground or whatever operation may be indicated.

Knowledge of Farm Problems Helps Make Tractor Sales

A Practical Tractor Dealer Outlines a Campaign to Get Prospects and Close Sales; Ability to Talk on Farm Topics is Big Factor in Selling

BY C. S. POTTER

President, Monarch Auto Co., Fordson Dealer

THE successful tractor dealer must be an enthusiastic believer in power farming. This enthusiasm must be shared by his whole organization so there will not be a weak link any place that may come in contact with the farmer's prospect. The question is, how are we to have this enthusiasm under such conditions as when we hear that the farmer has no money; there has been a six weeks' drouth; impossible for him to sell his teams; his boys are anxious to leave the farm and he has about come to the conclusion that farming doesn't pay. If the dealer will spend one week making a diligent study of power farming he can answer and overcome all of the above objections.

In this section each county has from two to four thousand farms. Prospect cards should be made giving detailed information regarding every farm. This means considerable work but is absolutely necessary in order to have accurate information.

Grouping Best Prospects for Demonstrations

With the help of your local banker, remembering that the farmer of today has had a number of profitable years and that you can discount most of his calamity talk, take approximately ten per cent of the best farmers as passed upon by the banker which will give you a prospect list of from two to four hundred per county.

Group these to the best advantage and start out your demonstrators with the determination to sell at least ten per cent of these live prospects which will mean twenty-five to forty outfits.

Send a tractor and one or two implements, depending on the season and the work that is being performed on the farm in your section and without making any previous engagement, drive into the field and ask permission to help with the work. Have the farmer and his son drive the tractor, leaving it with them while you go after some of the neighbors and endeavor to bring them over to look at the quality of work being done. Don't talk tractor—tell them about seed bed preparation.

Be qualified to talk about plowing at different seasons of the year, how to kill insects and weeds, the value of retaining moisture in the seed bed, etc., what

power farming means as a time saver on the farm. Get the boy interested. Tell him how he can saw more wood in a day than he could chop in a month. Tell the mother how power farming is keeping the boy at home, especially the one who drove a truck in France.

Show Facts

Have facts and figures. Tell of some well known farmer in the locality that has had a tractor for two or three years, his cost per acre to plow, the number of acres plowed per day, how one neighbor, during the wet spring of last year did not put a plow in the ground until May and had the biggest and best corn crop in that section.

You can quote some good local farmer who would tell you he would rather pay \$5 per acre for deep tractor plowing than have it plowed in the old way for nothing. A man who has experimented on his own farm and is basing this statement on actual returns.

Regard power farming as an investment that will pay big dividends in money and contentment, look on the farm as a manufacturing plant that must throw out obsolete machinery and methods and meet twentieth century competition. Know that you have the proper

implements for the tractor you are handling, advising the farmer to sell his old horse-drawn implements for they cannot stand the hard work of power farming and in a short while will be a total loss.

Convince the farmer that you are well qualified to pass on the tractor he should have and the necessary implements so that he will not have to make a lot of expensive experiments and say power farming costs too much.

After you have sold and delivered your power farming outfit, remember that it is your silent salesman in that neighborhood. Experience will show that a tractor properly placed and giving satisfaction will sell from four to six other outfits. Therefore, properly instruct the owner in the care and attention of the tractor and implements.

Inspection of the outfit should be made at regular intervals. Don't wait until the owner calls you and the tractor has been damaged; have your service man carry minor repair parts and good useful accessories and you will be able to have him show an actual profit on each day's work of inspection.

Talk proper lubrication every time you make a call and verify what the owner tells you. Ninety per cent of tractor trouble can be eliminated by doing this.

New Single-Six Packard Models Announced

DETROIT, April 18—The Packard company is now producing the single-six in two wheelbase lengths to suit different types of bodies. The five-passenger touring car, the two-passenger runabout, the five-passenger sedan, the four-passenger coupe and the four-passenger sport models are mounted on 126-in. wheelbase chassis.

The seven-passenger touring car, the seven-passenger sedan and the seven-passenger limousine are mounted on 133-in. wheelbase chassis.

The prices are based on \$2485 for the five-passenger touring and \$2685 for the seven-passenger touring. Mechanically there is but little change as compared with the previous single six. In order to take care of the heavier bodies and

to provide a standard engine for both wheelbases one-half inch has been added to the stroke, making the dimensions of the power plant now 3½ by 5 inches.

Another slight change is the addition of one driving plate to the disc clutch, making this now a four-driving plate type instead of three. The bodies are characterized by long low lines, accentuated by a bead strip which runs from the radiator around the entire length of the body and hood.

On the five-passenger touring the tool compartment is in a space behind the front seat with curtains in left door pocket. On the four-passenger sport model steel disk wheels are standard equipment.

New Things Automotive—Trucks, Buses, Equipment

THE Transport Truck line for 1922 includes six models, ranging in capacities from 2000 lbs. to 10,000 lbs. The line takes in the model 15, for light, fast transportation and having a capacity of 2000 lbs.; model 25, 3000 lbs. capacity; model 35, 4000 lbs.; model 55, 6000 lbs.; model 60, 7000 lbs.; and model 75 for heavy duty work, with 10,000 lbs. capacity. These trucks sell respectively for \$1295, \$1495, \$1885, \$2385, \$2585 and \$3485.

Chassis lubrication on all models is taken care of by the Alemite system, with well and wick oiling for spring and radius rod bolts.

Models 35, 55, 60 and 75 are equipped with double-action drive shaft service brake, which applies pressure equally to both rear wheels and checks the tendency to skid when turning a corner by proper control of the faster traveling wheel. A spring cushion brake rod prevents grabbing action when brakes are suddenly applied. Brake shoes set up slowly, giving a positive, but smooth, action.

Radius rod equipment on Models 35, 55, 60 and 75 makes it impossible for the rear axle to slip on springs, assuring perfect operation of braking mechanism under all conditions. By holding the rear axle in alignment with the frame, the possibility of undue wear on tires and strain on bearings is also eliminated.

Electric lights, bumper, hubodometer, motometer, radiator guards, jack and tool kit are part of the equipment that is regular throughout the line. Model 15 is equipped with starter.

In the model 15 the Continental N-4 cylinder engine is used. The rear axle is bevel gear type, transmission is designed and built for fast 2000-pound transportation.

Fabric universal joints are used, with Sneed shafts. This joint requires no lubrication and is easily serviced. It absorbs severe shocks occasioned by sudden driving strains, likewise protects engine from road shocks delivered to rear wheels.

This model is regularly equipped with pneumatic tires, electric lights, starter, electric horn, windshield, seat, running board, fenders, speedometer, jack and tool kit.

Model 25, is designed for somewhat heavier duty and is powered by the Buda WU.

The four-speed transmission makes possible the installation of an engine which effects a substantial saving in operation expense, yet providing ample power to haul full-capacity load. The road speed is 25 m.p.h.

In general design and construction, Model 55 and 60, for 6000 and 7000 pound

maximum loads, respectively, are similar. Engine and rear axle in the larger models are, however, designed for the more severe service to which this truck is subjected. Both of them have slow-speed, heavy-duty engines, with armored radiator. The Model 60 has a Buda HTU engine. The one used in Model 55 is Continental C-2.

Model 75 for heavy duty uses a Buda YTU four-cylinder engine. The gas is superheated by exhaust manifold before induction into the engine.

The transmission has four speeds forward.

The rear axle is of the internal gear drive type, same general design as used

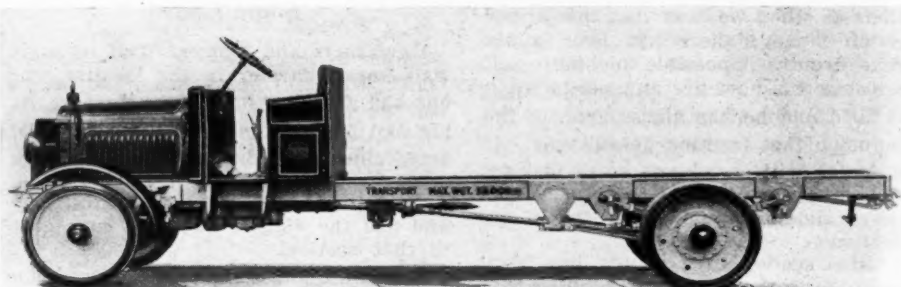
on Models 25, 35, 55 and 60, except that it is larger and stronger.

Model 75 has a 12-in. road clearance, which is ample to keep differential housing from dragging and to enable truck to travel anywhere an automotive vehicle can be operated.

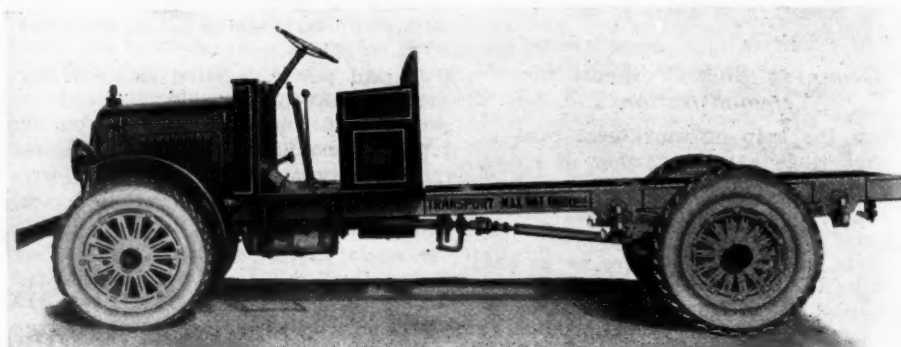
This model is regularly equipped with cast steel wheels.

Krohn Kompensator Differential

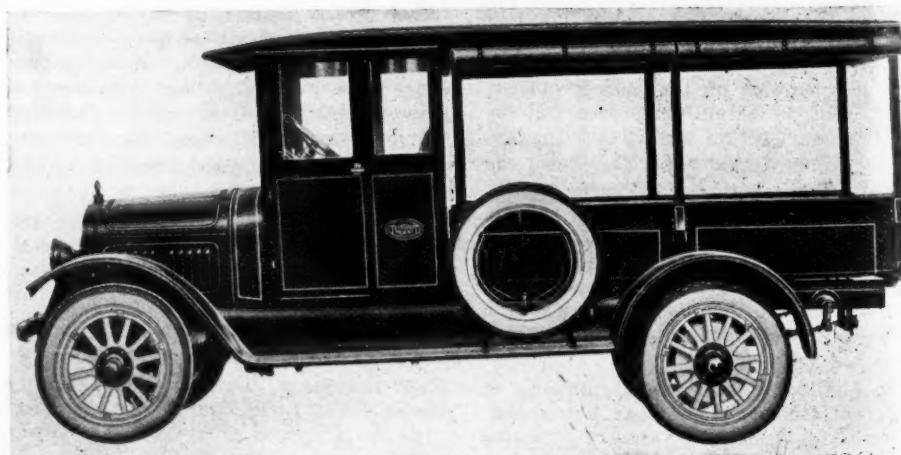
THE true function of a differential is to compensate for the difference in rotative speed between the driving wheels of a power driven vehicle. This



Transport model 75 for 10,000 lbs. maximum load



Transport model 35 for 4,000 lbs. maximum load

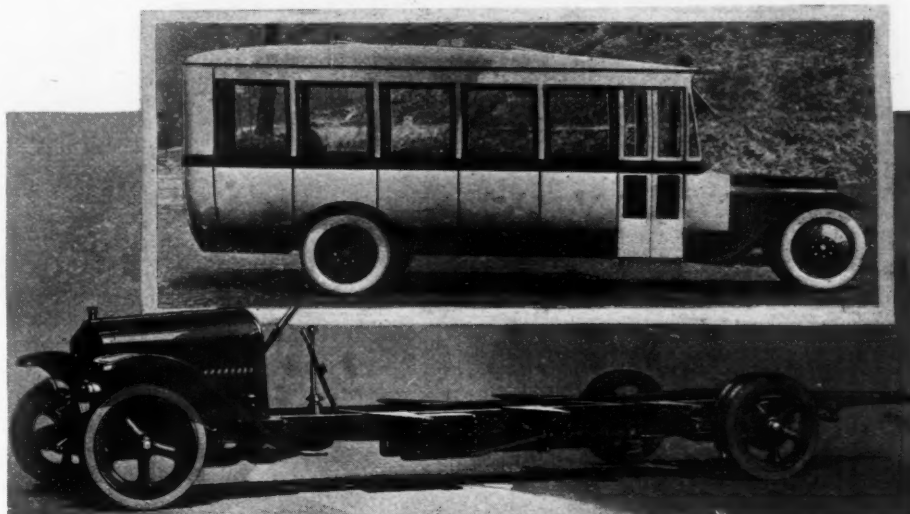


Rapid Transport, maximum capacity 2,000 lbs.

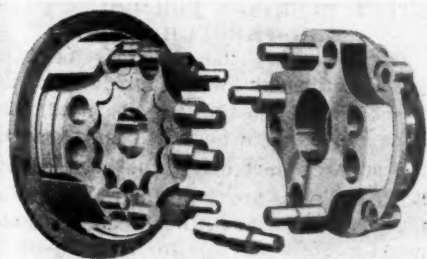
compensation should be brought about without a total loss of tractive effort to the driving wheel on which tractive effort is most needed as would be the case of a car on a slippery road with one wheel on solid dry ground and the other on the slippery non-adhering surface of the road. The conventional bevel and spur gear differentials construction as commonly used in cars today by virtue of its construction would allow the wheel with the least road resistance to revolve while the other wheel on the solid dry surface would receive practically none of the engine power. A differential so designed that through the medium of inertia brought about by the increase of friction of lubricated surfaces a portion of the total engine power is applied to each wheel regardless of its position is being marketed as a replacement device for Ford rear axles and is known as the Krohn Kompensator. With this construction the wheels are not positively locked but by insertion of resistance the wheels receive a proportionate amount of tractive effort according to their respective positions on the road. Normal differential action takes place in this device in the same manner as in the conventional differential. However, when the speed is increased the internal resistance of the mechanism increases at a rate greater than the speed of the axle and increased tractive effort is supplied to the wheel in greater need of traction. This increase in resistance has an approximate value of the cube of the speed and follows the laws of fluid friction. The details are as follows: Power transmitted to the differential case through the master gear goes through the double eccentric rollers to the two central driving plates. These plates constitute an internal and external gear respectively. These gears mesh with internal gear fastened to one axle shaft and an external gear fastened to the other axle



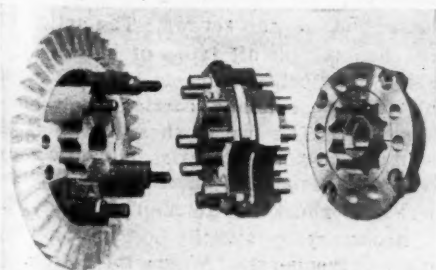
Republic Knight-motored bus with capacity for 25 passengers



White chassis and body designed for bus work



Ford ring gear mounted on Kompensator housing



Closeup of left half of differential housing showing novel contour internal external gearset teeth

shaft. When differential action is necessary such as when turning a corner, the internal gear on one shaft and the external gear on the other shaft revolve in opposite directions. The two driving plates then revolve as a unit around the eccentric rollers. The rollers revolve at a speed much greater than the shaft gears due to the eccentric internal and external gearsets. The oil film on these fast revolving surfaces offers increasing resistance to speeding up, which gives most of the advantages of the locking differential at high speeds.

The Krohn Kompensator for Fords is interchangeable with the regular equipment and requires no change in the axle for its installation. The Kompensator is manufactured by the H. McFarlane Co., 322 S. Green St., Chicago.

New White Model Designed for Bus Service

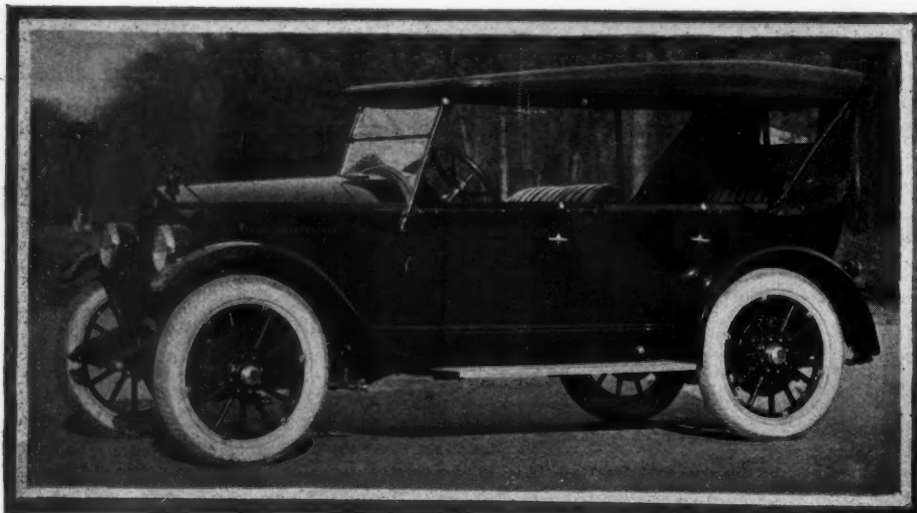
A SPECIAL type of motor bus having features of design which are important in passenger transportation has

been brought out by The White Co., Cleveland.

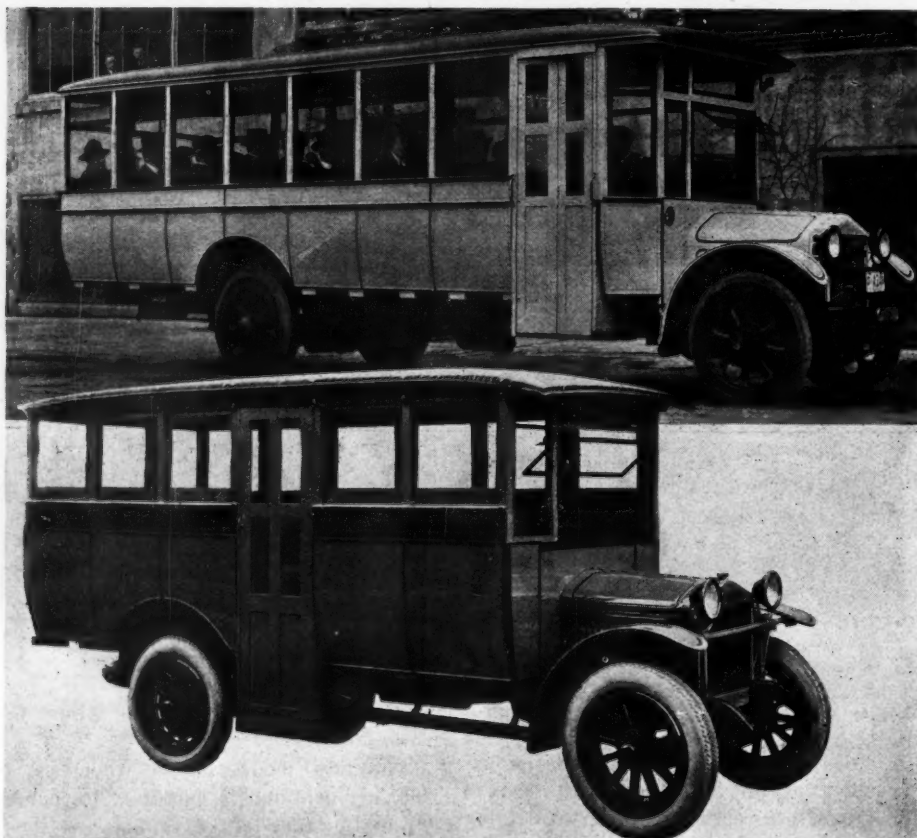
The new model has a wheelbase of 198 in., making it possible to mount, without excessive overhang, a body which has comfortable seats for 25 passengers. Because of its low loading height, only one step is needed at the entrance.

Two types of bodies have been designed for the bus chassis—one known as a city type, and the other an interurban type.

Standard equipment includes generator and electric lights, side braces on the frame, steel wheels and solid tires, single in front and dual in rear. This tire equipment is especially adapted to operation on city streets. Pneumatic tires and disk steel wheels can be furnished, if desired, for interurban operation. This tire equipment does not raise the low center of gravity nor increase the frame height. The use of various optional standard gear ratios makes possible a wide range of speed and acceleration.



Essex phaeton which has several body improvements



Two Garford bus models, type J at top and type I depot bus below

Garford Depot Bus

WITH a desire to serve the particular transportation needs of hotel, country club and summer resort guests, The Garford Motor Truck Co. has produced a special passenger carrying unit, known as type "I" bus. From 35 to 40 miles per hour is its normal rate of speed.

The body is designed for the comfortable seating of 11 adults. In an emergency, the wide aisle provides standing space for carrying additional passengers.

The passenger entrance door is placed in the center of the body on the right side, which allows space forward of door and to the right of driver's seat for baggage and luggage. The driver's door

is placed on the left side of body and to the left of driver's seat.

The upholstery is of rattan with an optional choice of imitation leather. Hand rails attached to ceiling, four dome lights, four ventilators and bumper at rear of body, tool box under rear seat, are provided as standard equipment. Body is also constructed for installation of tire carrier, rear emergency door and heaters, if desired.

Garford Type J Bus

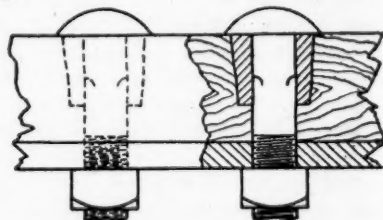
This model has a specially designed engine. The frame is only 25 in. from the ground giving a low loading height. Special steel cushion wheels are used. This bus has a seating capacity from

25 to 29 passengers. It is equipped with cross-wise seats covered with either rattan or imitation leather, heating and lighting system, electric light, electric buzzer system with push buttons at each window post. Entrance door is of the folding type on right side of body and operated by the driver. It has an emergency rear door and advertising panels.

Essex Phaeton Improved

WITH a view to increasing the comfort and the passenger capacity of the cars, several improvements have been made in the design of the Essex phaeton. The body is entirely new, being longer and wider. Body doors are also wider and hinged at the front. They now have inside as well as outside door handles and the front pockets are enlarged to accommodate the improved storm curtains.

A new windshield, with a more handily operated top glass and forged side supports, is used. The shield and the top are lowered the same amount. The head room remains unchanged, however, because the cushions are lowered and the general seating position is modified. A nickel robe rail is provided in the tonneau. Fenders of a new style, fully crowned, and harmonizing with the general lines, are used. Chassis changes include the adoption of a round gasoline tank, new type gasoline gage and carriers for a single tire. All new cars are equipped with the new type chassis oilers that replace the former grease cups.



STEEL BUSHINGS FOR BOLTS PASSING THROUGH WOOD

To overcome the difficulty of bolts passing through wood turning in the wood a steel bushing may be used, with a squared hole where the bolt head or the squared part below the head comes. Such bushings are being marketed under the name Harbuck bushings and are made in sizes suitable for from 1/4- to 2-in. bolts. They may be used in connection with carriage bolts, countersunk head carriage bolts, deck bolts and machine bolts or cap screws. The action of the bushing on all types of bolts is the same. A flush surface is obtained with all but the common carriage bolt construction. The use of these bushings is said to be particularly advantageous where the part or mechanism is subjected to shock or vibration or where it is necessary to take the bolt out and replace it frequently. Where the bolts and bushings are subject to corrosion, non-corrosive metals are used.

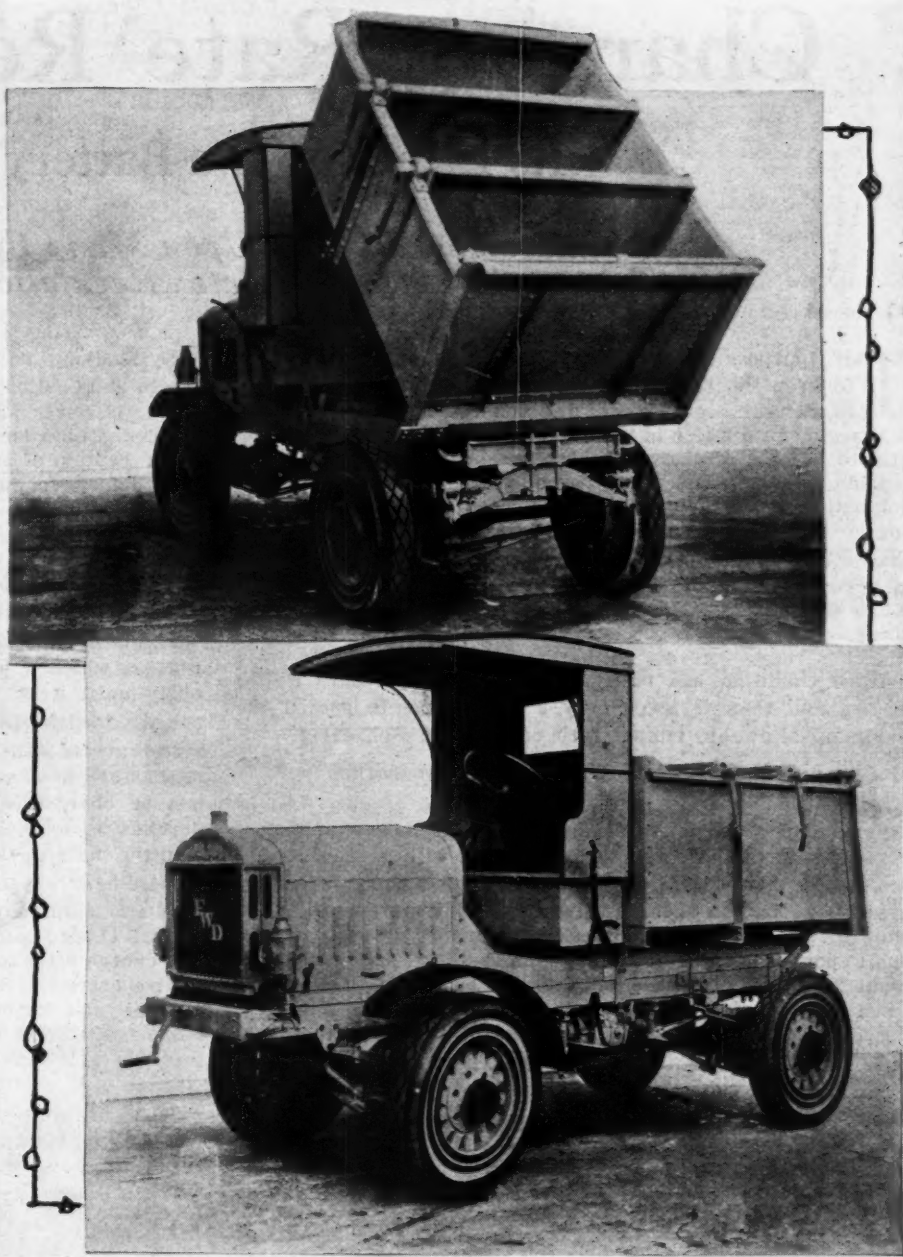
F. W. D. Brings Out Road Builder Truck

ONE of the recent developments in the truck field is the Road Builder truck, which has been placed on the market by the Four Wheel Drive Auto Co., Clintonville, Wis. One of its salient features is the short turning radius, made possible by a wheelbase of 105 in. making it easy to turn on narrow grades without the difficulties often encountered with trucks of a long wheelbase. The truck is designed to carry a three-section body of three tons capacity, the body being operated by a horizontal hoist and the tail gates individually. The truck also is designed to be used as a tractor for trailing loads to the concrete mixers and for hauling machinery.

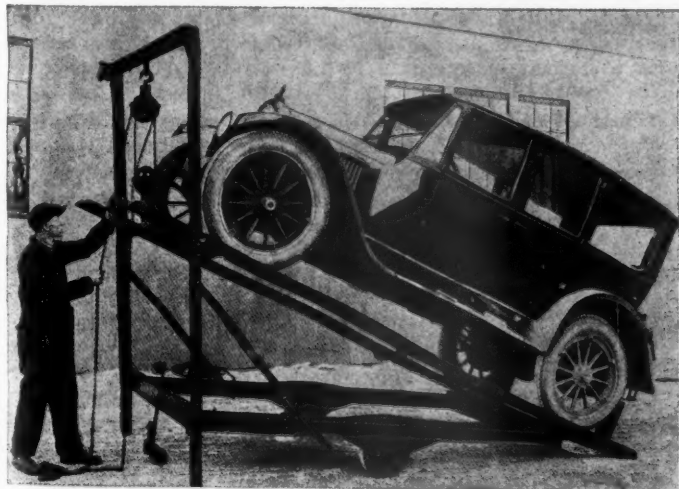
The tread, front and rear, is 60 in. and the turning radius 20 ft. 6 in. The truck has a speed of 15 m.p.h., regulated by a Pierce governor. Front and rear tires are 36x7 and 36x8 in., respectively. The overall length of the truck, including crank, is 181 in.

Martin Hoist and Dolly

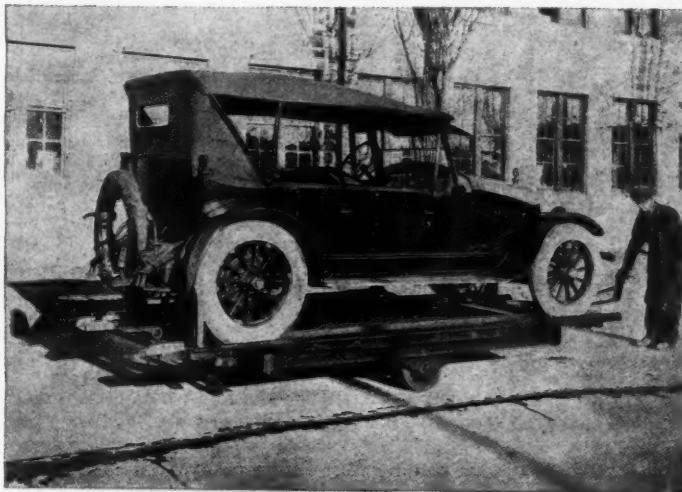
The Martin Auto Hoist presents an interchangeable piece of equipment for sales, demonstrations, repairs, instructions, supervision, assembling and repairing passenger cars, trucks, etc. With it one man can raise a heavy car with ease and also swing an engine from a chassis. Two or more men can work in comfort on a vehicle when it is elevated. It is fitted with steel wheels and Goodrich solid rubber tires, so that a vehicle can be towed on it. It is made of steel throughout and the dimensions are height, 18 in.; length, 15 ft.; width, 6 ft.; capacity, 7500 lbs. It does not require the space ordinarily needed to turn a car completely around. High speeds are afforded by it on the road and no attendant other than the driver of the tow car is needed. It adjusts itself to road conditions. The price is \$375. The T. A. Martin Equipment Co., Bridgeport, Conn.



The Road Builder truck, a four-wheel drive vehicle designed especially for road work, etc. It is featured by a very short turning radius



Martin hoist as used in repair department



Martin hoist used to carry car

Charging Rate Regulation

Its Effect on the Battery's Life

Requirements Depend Upon Many Factors. Four Types of Charging Rate Regulation Explained

THE purpose of all charging rate regulations is, of course, to keep the battery fully charged and at the same time to prevent overcharging and consequent battery trouble. A charging rate which is too low will allow the battery eventually to become discharged which will necessitate a recharge outside the car. And it may even injure the battery through sulphation if the deterioration has been slow and if the recharge is not given immediately. On the other hand, if the charge rate is too high it will overheat the battery and result in a complication of "diseases" usually ruining the battery. While the battery is in a discharged or semi-discharged condition, provided it is otherwise normal, the ordinary high charging rates will do no harm, but the moment a fully charged condition has been reached the temperature begins to rise and then it takes only a short time to exceed the maximum allowable temperature of 110 deg. Fahrenheit.

110 Deg. F. Safe Maximum Temperature

Let us take the case of the man who does a great deal of city driving, a doctor for example, with a large number of stops and starts and only short drives. It will be seen readily that such a man would require an enormous amount of energy from his battery in the excessive use of his starter while the short drives would enable the generator to put back only a small portion of it. To keep the battery fully charged, about 25 per cent more energy should be put back than was taken out, due to line losses, incomplete chemical reactions, etc., or this battery would soon go "dead." The only real remedy in such a case is to increase the generator output to take care of the excessive demand after having first recharged the battery from an outside source.

This, of course, is an extreme case and the other extreme may be found in the tourist or country salesman, where very few starts are necessary and long drives at fairly high speeds are the rule. It does not take much of such driving to restore to the battery what energy was used in one start and the current generated after that is only dissipated as heat in the battery. It should be noted that the charging process is always accompanied by heat. It is inevitable and, up to a certain point, harmless. Manufacturers have not agreed as to the exact temperature but under no circumstances should it be allowed to go above 110 deg. F. and 100 deg. F. is a much safer maximum.

Study of Individual Driving Conditions

It is clearly impossible to formulate an iron bound set of rules governing charging rate regulation because the required rate depends upon so many varying factors. It becomes a matter largely of experience and judgment. If the battery requires additions of water more frequently than ordinary it is good evidence that it is being overcharged and the violent gassing is expelling the liquid at the vent holes. Also the high temperatures cause the water to evaporate more rapidly. Although only the water in the solution will evaporate, the gassing throws out a spray of electrolyte, both water and acid. Consequently if only water is added the strength (specific gravity) of the electrolyte will slowly decrease. Symptoms of undercharging, too low charging rate, are dim lights with engine idle, and difficulty or failure of battery to operate starting motor. These troubles, of course, may be due to other causes and will require careful attention before the charging rate is tampered with.

By studying individual driving conditions it is usually possible to make adjustments that will produce satisfactory results but it is never advisable to make wholesale changes unless decidedly unsatisfactory operation is encountered. With the one exception of summer touring, an adjustment that is found satisfactory for an individual's average driving should be maintained. The case of touring, however, is different and requires special attention. A little help very commonly recommended is to burn the lights when taking long drives. This shunts a part of the generator current away from the battery but is usually not enough to take care of the surplus.

The term "normal charge rate" used here indicates that current at which a discharged battery can be charged continuously until it is "up" without injury. Some manufacturers use the terms "start" and "finish" rates, and in such case the start rate is considerably higher than the normal and the finish rate is slightly lower. The rate at which a battery can be charged continuously without damage (normal rate) depends upon three factors, namely, the number of plates per cell, the plate thickness, and the area of the plates. Since the ampere-hour capacity also depends upon these same factors a relationship may be found between the capacity and the normal charge rate. The accompanying table shows the normal charge rates for the various sizes commonly found in automotive service. It is possible with this data to make some general rules for charging rate regulation in terms of ampere-hour and normal charge rate.

Four Types of Rate Regulation

There are four types of charging rate regulation which have had rather widespread use in the past. They are the Third Brush, Third Brush-Thermostat, Constant Current and Constant Voltage.

The great majority of cars are now equipped with the third brush regulation manufactured by Delco, North East, Auto-Lite, Wagner and others. Here the generator output increases as the speed increases until about 25 miles per hour has been reached when with further increased speed the output decreases. It is this maximum rate at about 25 miles per hour with which we are concerned and with this type of regulation it should be about double the normal rate for average conditions. For example, a 105-ampere-hour battery (see table) with a normal charge rate of 7.5 amperes should have not to exceed 15 amperes as the maximum.

The third brush-thermostat is a Remy patent and is manufactured only by that company. It will be found on Oakland, Reo, Scripps Booth, Studebaker and others. In this type the thermostat, which is connected in the shunt field circuit, is closed while the temperature of the generator is below a certain point. This allows a heavy current to pass through the field coils and a correspondingly high generator output at the start. After about 20 minutes of running the rising temperature inside the generator causes the thermostat to automatically open and throw a resistance coil into the circuit. This weakens the field and materially reduces the charging rate. The third brush is connected in the usual way and the adjustment is effected by moving it. With the thermostat closed the maximum rate should not exceed two and one-half times the normal. In the case of the 105 ampere-hour battery the maximum should be about 18 amperes, while with the 95 ampere-hour battery the maximum should be about 15 amperes.

If this high starting rate is correct the lower rate with the thermostat open will automatically be correct.

Constant Current and Voltage Types

The Constant Current and Constant Voltage types of regulation are not having a very extensive application. The Constant Current type with its vibrating regulator was used on the Model 25 Maxwell. Wherever it is used the maximum current, after it has reached a constant value should be about one and one-half times normal. The Constant Voltage type such as that manufactured by Bijur and used on certain models of Packard and Pierce-Arrow, consists of a voltage coil connected directly across the generator brushes.

While reduction of charging current with the Remy thermostat is made in one step or single reduction, when the thermostat contacts open, the voltage regulator action is gradual, due to the vibrating contacts being held open for greater periods of time by the increasing action of the voltage operated coil, so that this type regulation gives the theoretically correct tapering charge to the battery.

While really a voltage regulator it can be set by watching the current which should be about three-fourths of the normal rate when the battery is in a charged condition, the gravity being 1280 and the voltage at the battery being about 7.5.

It must be remembered that all these adjustments, with the exception of that for Constant Voltage type are for average conditions. Whenever departures are made from the average the proper allowances should be made in the adjustment. For summer touring these rates usually should undergo a 25

Capacity in Ampere-Hours at 5-Ampere Rate	Normal Charge Rate	Manufacturers' Types			Some Cars Using These Sizes
		Willard	Prest-O-Lite	Exide	
54	4	SJ26	127SHC		Dodge, Franklin
85	5.75	SL3	611RHN	3XC-13	Allen, Cleveland, Ford, Interstate '19, Monroe
90	6	SM4	613WHN	3XC-15	Allen '19, Briscoe, Maxwell
95	6.5	SJ3	611SHC		Apperson, Auburn, Elgin, Marmon, Hupmobile, Jordan, Mitchell, F. Baby Grand and 490 Chevrolet
105	7.5	SL4	613RHN	3XC-15	Overland, Chalmers, Chandler, Essex, Grant, Hudson, Moon, Oakland
115	8	SJ4	613SHC		Buick, FB - 50 Chevrolet, Haynes, Kissel Kar, Lexington, Nash, Reo, Oldsmobile, Studebaker
125	9	SL5	615RHN	3XC-17	National
135	9.5	SE4	613BHN	.....	Cole
160	10.5	SJ6	617SHC		Pierce-Arrow, Locomobile

TABLE 1:

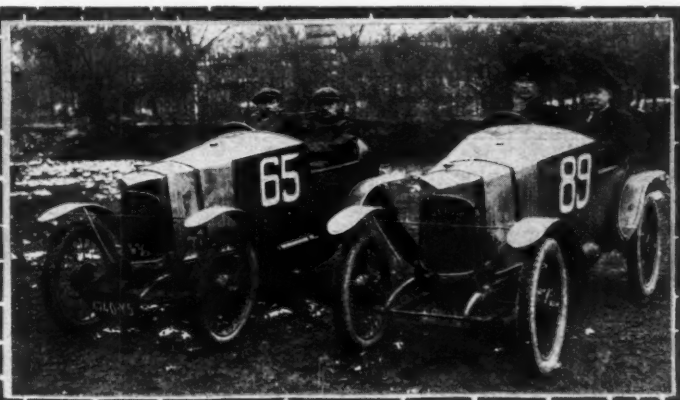
All cars mentioned in this table are 1920 model passenger cars unless otherwise noted.

per cent reduction. But the Constant Voltage regulation is designed to take care of all conditions and only one adjustment is ever necessary.

The above rules are summarized in Table 2, below:

Type of regulation	Per cent of normal charge rate for average	Per cent of normal charge rate for touring
Third Brush	200 per cent	150 per cent
Third Brush-Thermostat	250 per cent	175 per cent
Constant Current	150 per cent	100 per cent
*Constant Voltage	65 to 85 per cent	No change nec.

*This applies when battery is charged. Gravity up to 1280 and voltage up to 7.5 while on charge.



Fournier 61 in. and Mathis 45 in. 2 seaters

French Cyclecars in 2300-Mile Reliability Run Must Average 24 4-5 M. P. H.

THIRTY French cyclecars are at present taking part in a 2300-mile reliability contest around France on the basis of an average speed of 24 4-5 miles an hour. These little machines are two-seaters, generally on standard car lines, with four-cylinder engines which are limited to 45 cu. in. for the smaller class and 61 in. for the bigger class. The weight of the machine is limited to 771 lbs.

In addition to the regularity basis at

an average which is considered high for such cars, it is necessary to make the run without changing any part and without the breakage of any essential part. The French industry attaches considerable importance to these trials as an opportunity of demonstrating the value of a type of economical automobile in which it has specialized. Government support has been given to the development of this class of machine by admitting all automobiles of not more than 61 in. pis-

ton displacement and 771 lbs. weight to the reduced annual tax of 100 francs a year. Outside this class, taxes are at least four times higher.

Starting from Paris the reliability trials follow the frontier or coast line around France and return to Paris after covering a portion of the Alps and the former war area in the north. The 2300-miles have to be covered in 12 daily stages, with rest days and exhibitions at Bordeaux, Nice, Strasbourg and Lille.

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The Landis Award Agreement

THERE is an interesting experiment going forward in Chicago that is of interest to every business man and concerning which the building trades of the entire country are giving their close attention.

This is the struggle between the labor unions and the Committee to Enforce the Landis Award. The history is that the building trades labor unions in Chicago got into bad hands at some previous period and when the time came to adjust labor and other prices after the war the unions declined to come to terms with the employers. Finally it was agreed by all concerned that the situation should be submitted to Judge Landis, then on the United States bench. After a long period of hearings, Judge Landis handed down a working agreement which adjusted wages on an entirely new scale; that is, he put the different crafts in a new relation to each other as to the amount of a daily wage. Also he injected into the award many conditions that would do away with inter-union strikes.

The contractors accepted this award as they had agreed they would, but only some of the unions accepted it. Then came the naming of the Committee to Enforce the Landis Award. This committee agreed to supply workers for contractors in case the union men would not work. Open shop was declared in all

cases where the unions held off. Craftsmen have been imported for these jobs and the unions have declared war. The use of thugs and threats are frequent.

The Committee to Enforce the Landis Award is going ahead with its work and is even supplying insurance for work going forward by contractors working under these conditions. The committee is determined to bring building cost down in relation to other decreasing costs and to stamp out the bad control of the Chicago unions. This work has been carried on in other cities but not to the extent, or under the extreme conditions, as in Chicago. It is an interesting experiment and probably will mean much to those interested in building in every part of the country and automotive men always are, for their buildings are never large enough.

What Are You Selling?

A GOOD many automotive dealers are selling only cars, and some of them decline to sell used cars. Their idea appears to be that the new car is the only merchandise worth retailing. MOTOR AGE has always held that these men were mistaken, that they were using their energy to create a foundation for other men to set up profitable and growing businesses around them. The man who profits most is the man who organizes to sell each customer all of the merchandise he wants in his line.

The "Ask 'Em to Buy" campaign has done excellent work and is now gathering figures to prove the worth of this work. A factory salesman who sells only his one line took the trouble to interest one of his customers in the full accessory line. This man brushed up his salesroom, put in a salesman and went after the business at the first of the year. Here are his sales reports:

Month	Turnover
December	\$ 509
January	1300
February	2000

That volume of business is well worth while. A Ford dealer, who knows how to keep books and how to go after business, has made this report for his business for January and February of this year:

New cars and trucks	\$1,751.50
Used cars and trucks	854.50
Ford car and truck parts	2,653.15
Accessories	3,698.28
Tires and Tubes	685.54
Gasoline	1,673.99
Oil and grease	392.41
Storage	862.89
Labor	1,366.79

How much of this volume did you miss?

The Tail Light

THE railroad men assigned to the task of making railway travel safer and for making the tracks safer for those who either by necessity or desire cross or travel along them, are taking their work quite seriously. They are not only looking into the running of railway trains, but they are inquiring as to why so many persons who come onto their right of way are killed or injured. In this search they have classified these accidents and they find that the number of automobiles struck at crossings by trains is quite a considerable item in their list.

It further develops that a number of these accidents were caused by drivers of motor cars ignoring the red lights swung from the gates that are supposed to protect the crossings. The reason several of these drivers ignored the warning light, was that they thought it was

the tail light of an automobile crossing the track in front of them.

This discovery has suggested to the railroad men that probably the automobile builders have been wrong in selecting a red light as a tail light. A somewhat casual inquiry into this situation has brought to light a number of cases where drivers of motor cars have followed another car some distance and, when the leader had turned off, the light on an excavation or obstruction had been mistaken for the light on the automobile that had taken another road.

The big thought is that if another color was adopted for the tail light for the automobiles, then the red light could be restored to its real meaning as a danger signal. At present, the chief meaning of the added stop signal is that the car in front has two red lights instead of one and in this day of progressiveness, the driver behind may think that this is a new way of making the car decorative.

The railroads cannot be accused of dodging this question or attempting to evade their share of their responsibility, as they recently have been buying very large editions of the stop signals now becoming so popular with motor car owners and are placing these on the crossing gates in order to make their signals more impressive to the motorist. Driving safety is a question that must be solved and those within the industry should give to it their best attention.



Why Not Give It A Trial?

THE coming of summer offers an opportunity to the service man and the owner for some interesting and perhaps profitable experimental work. Designers in their effort to produce an efficient engine have built engines with comparatively high compression ratios. These engines, when used with fuel that is unsuitable, are subject to many ills that are often times baffling to solution. Because the present day fuel is what it is, even some of the comparatively low compression engines are susceptible. Cases of burnt and pitted valves are in a very large number of instances due to the ill effects of the fuel used.

Chronic knocking on acceleration and under comparatively light loads is another symptom produced by the same cause. The inability of benzol to remain fluid when subjected to low temperatures has prevented more extensive use of it as an engine fuel. The average run of benzol as it comes from the steel mills will freeze at approximately 25 degs. Fahrenheit. The blending of certain other elements with the pure benzol enables it to be used without danger of congealing at temperatures as low as minus 10 Fahr.

Compression ratios as high as 6.75 to one are permissible with benzol without signs of detonation. It also brings about a noticeable reduction in crankcase dilution. With these facts in mind it would be time well spent for the service man to give some attention to this fuel, especially during the summer. It would at least prove interesting to the men who are engaged in servicing the cars that are pronouncedly affected with any of the above mentioned troubles.

The successful use of blended benzol by one of the largest taxicab companies should remove some of the apparent objections. It is not intended to point to it as a cure all for engine ills because its degree of success is greatly determined by the design of the particular engine in which it is used.

A simple comparative test can be conducted and the

amount of crankcase dilution, the mileage obtained, and notes regarding performance especially in regard to knocking should be recorded for comparison.



More Motor Vehicle Taxes

ANOTHER state is about to put another tax on the automotive vehicle. The Maryland Senate has passed the bill which imposes a tax of one cent a gallon on gasoline and has under consideration a bill that will double this tax after Jan. 1, 1924. This is just another way of putting a tax on the owner of an automotive vehicle and calls attention to the tendency of the present day law maker to classify automotive vehicles as things that are more or less of a luxury and that the owners of such vehicles should be taxed all that they will stand.

Recently it appears to be the thought that good highways are built solely for the benefit of the automobile owner and that he should pay the entire bill. Formerly it was the argument that good highways were an asset for the entire community and should be paid as a community bill, chiefly by a land tax. It is strange that the transfer from the horse to the internal combustion engine as the burden bearer should make such a revision in the manner of reasoning.

Every dealer should make it his business to become acquainted with his legislator—city, state or national—and sound him out on these theories and put him right. If he insists that all tax burdens should be carried by the automotive industry, get busy and defeat him before he defeats you by piling up so high a tax that you cannot sell vehicles.



Can You Afford To Be Without— A Shop Crane?

THE removal of an engine from a car, or elevation of the rear end of a car to get at the axle necessitates a considerable amount of lifting. This can be made an easy job or a difficult one, depending upon how well the shop is equipped.

In some shops this kind of work is done by several of the men pitching in and lifting the engine in or out of the frame. In an emergency this may be all right, but it takes time and means an expense of considerable energy on the part of the men. Many shops have home-made devices consisting of a wood framework from which is suspended an ordinary chain or hoist. These cranes, unless well made, are bulky and limited in their usefulness.

A good shop crane, and the market affords any number of them, is a real asset, both from the standpoint of usefulness and conserving the energy of the men. A lot of the work done on cars or trucks is hard work and when men get tired near the close of a day they are less apt to do good work. A crane not only makes it possible for one man to do the work of several, but is a good investment from a safety standpoint.

It cost one shop considerably over the price of a good crane because the men dropped an engine and smashed the crankcase and otherwise damaged the engine. It looks businesslike also to go into a shop and see men working with equipment essential to the proper handling of such a shop. A crane of the portable type, we believe, is one of the best investments that a shop can make and we cannot conceive how it is possible to get along without one in these days when the question of making maintenance pay is uppermost in the minds of dealers.

Demand Speeds Up Production

April Business Promises to Exceed That of March

Manufacturers, Slow to Believe Depression Over, Being Pushed by Sales

NEW YORK, April 18—With April more than half gone, manufacturers of motor vehicles still are speeding up production. There is every reason to believe the month will show as great a gain over March as was recorded by March over February. That was approximately 32 per cent and it was 65 per cent in excess of the preceding March.

Sales at retail, so far as can be determined, are keeping practically abreast of production. It is certain, at any rate, that no large surplus of finished products is being built up.

Up to this time the industry has been rather hesitant about accepting the theory that the country actually has begun the long swing back from depression and even now there is no disposition to abandon caution in commitments, but it is generally believed that any decline in sales this year will be merely seasonal.

Company after company is coming through with reports of greatly increased output for April. This applies to truck manufacturers as well as to those in the passenger car field. The largest producers of heavy duty vehicles assert that April orders will exceed any month since May, 1920. Makers of light trucks agree that business is excellent. Ford production is approaching capacity but the proportion of trucks turned out is much larger than it has been in many months.

Dealers everywhere are as optimistic as builders. Factory enthusiasm, in fact, is based solely on sales. Not only is there a strong demand for new vehicles, but the market for used cars is so strong that in most places they have ceased to be a sales deterrent.

Demand for motor vehicles is not peculiar to a few sections of the country but is practically universal. Even the south and the grain growing sections of the middle west are buying in considerable volume. The farm market generally is steadily expanding, especially for commercial vehicles. The same is true of the industrial centers. Business in Canada is keeping abreast of the United States.

It is reported in a few of the larger cities that factory workers are beginning to buy used cars and inexpensive new cars. It is significant that the bulk of the passenger car buying is in the low and middle priced classes. The percentage of increase in these fields is

much greater than in the high price class, although a few companies turning out comparatively expensive products are having the best business in their history.

Production in parts plants continues to gain rapidly and many of them are having the largest business in nearly two years. Several expect April to be the best month in their history.

"Ask 'Em to Buy" Film Causes Much Window Washing

SALT LAKE CITY, Utah, April 15 —A 30-day tour of Utah, Idaho and Wyoming showing the "Ask 'Em to Buy" film of the Automotive Equipment Assn. has been completed by Vern A. Culver, salesmanager of the Motor Mercantile Co. Culver reports that he talked and showed the film to 978 men engaged in the automobile business.

"I usually stayed in town a few hours the next morning after the show," he says, "and I can truthfully state that I never saw so much window washing and dirt flying in all my trips over the territory as I saw in those towns after the show. If no other results were obtained this is worth the effort we have spent, as there is no question that we have some of the best garagemen in the country, but the dirtiest places I have ever seen."

Durant Addition to Lansing Plant Started

Lansing, Mich., April 18—Ground has been broken for an addition to the Durant Motor Co.'s plant here which will give it capacity for the production of 400 Star cars daily. Manufacture of the Star car is expected to start in the present plant in May. The new plant will have additional capacity for daily production of 200 Durant cars.

Contracts have been signed with the Auto Body Co. of Lansing for the manufacture of open bodies for the cars built in the Durant plant here.

WALKER PLAN APPROVED

Cleveland, April 15—Sufficient of the waivers to carry out the refinancing plan for the H. J. Walker Co., makers of automobile engines, have been received, according to an announcement made here.

Waivers to 70,000 shares of the stock of the company have been received from stockholders in response to the notification sent out by the company, that the reorganization syndicate would proceed with the refinancing plan. The success of the plan was contingent upon release being received for 65,000 shares.

110,000 Fords Probable Production for Next Month

Output Figures of Other Detroit Plants for First Quarter Show Decided Improvement

DETROIT, April 15—The production schedule of the Ford Motor Co. for April closed with 101,164 cars and trucks, which will exceed last year's production by 10,000. An increase of 200 men daily has been made for two weeks at the Highland Park plant and the employees now total nearly 40,000 men. Tractor production has reached 400 daily.

Ford officials say that the business now in sight will justify making 110,000 cars and trucks. The Canadian factory is expected to run at its capacity of 225 cars a day for the next three months.

General Motors with a combined output of 66,000 cars for the first quarter, will materially increase production the second quarter.

The estimated production of Dodge Bros. for the second quarter is 52,000 or more than double the second quarter of 1921.

Hupp shows 6,344 cars for the first quarter and expects to make 12,000 in the second as against 4,500 in the same period last year.

Packard made 2234 cars and trucks in the first three months of 1922 and expects to turn out 4000 in the second quarter as against 2200 the same period last year.

Maxwell has a schedule of 200 a day or a total of 15,000 for the second quarter compared with sales of 4500 in the second quarter of 1921.

Willys-Overland is turning out 400 cars a day or at the rate of about 30,000 for the second quarter which will double the second quarter of 1921.

AKRON TIRE PRODUCTION

Akron, O., April 18—Tire production in Akron today is at the rate of 22,500,000 casings and 25,000,000 tubes a year.

Figures of the Rubber Association of America show slightly over 21,000,000 tires manufactured in the United States in 1921, Akron making more than 16,000,000 of that number. If this same proportion of tire production holds good for the entire year, based on Akron's estimated tire production, there will be close to 35,000,000 American tires built in 1922.

A census of Akron tire companies shows the following present production tickets: Goodyear, 22,000 a day; Firestone, 21,000; Goodrich, 14,000; Miller, 6,000; General, 2,000; Seiberling, 2,000. All others, 8,000. Total, 75,000 casings daily.

Hoover for Trade Associations

Increased Schedules Now Prevail at Indianapolis

Both Automobile and Accessory Manufacturers Report Larger Outputs

INDIANAPOLIS, April, 15—There has been a sharp upturn in automotive manufacturing in Indianapolis during the last few days. Reports for March, from a dozen representative manufacturers of cars, parts, accessories and engines, show that March records far surpassed those of February, and in some cases are running ahead of the best early season records of last year.

Cole reports that February and March exceeded 1921 records by 50 per cent. March itself far better than last March, while its production and shipment figures exceed those of February, 1922, by more than double.

H. C. S. January, February and March of this year, double the records made last year, while April shipment will apparently be 100 per cent in excess of those of March.

Marmon. Production and shipment figures for early part of this year, twice those of the 1921 period. March and April shipments are far ahead of out-put for same period last season. Present production monthly average nearly to maximum point reached last year.

Stutz. First quarter production and shipment more than 20 per cent ahead of same period last year. March, 1922, 50 per cent increases over February. April business expected to keep up to March and probably pass it.

Lafayette. First buying spurt began at New York show, and the orders and consequent shipments have kept up. March business better than the preceding months. A new increased schedule was begun 30 days ago and shipments from this will begin the latter part of the month.

Automotive Parts Co., makers of automobile fans, report that February and March business was up to peak reached during boom period. April will be the biggest month the concern has ever had. Night shifts working at least three days a week.

Oakes Manufacturing Co., fan makers. Within the last three or four weeks this company has experienced a very sudden and large demand for its products. Production and shipment now within one-third of the volume of boom times. Far ahead of last year, same period. Night shift also being operated here. Some of this business due to orders from other than automotive concerns, though automobile parts are still a major factor in the business.

Mid-West Engine Co. Light production

during January, at this plant which increased at least 12 per cent during February, and an equal amount during March. April will show more than 20 per cent increase over last year marks. New contracts on which delivery will start in a little more than a month mean considerable increases later on, without increase orders from old customers who are now buying more engines than in previous months. Revived truck and tractor and bus business, for which Mid-West engines are used, seem to warrant that present revival is not a mere spurt.

Robert H. Hassler, Inc., Shock Absorbers. Production and sales, first quarter, 25 per cent beyond figures for last year. Increase about keeping up with the records of last year's shipping increases, without any particular spurt.

Burpee Johnson, shock absorber makers, also report increased business for the first quarter and production and shipment in excess of last year. Present out-put at least twenty per cent better than for same period last year.

Wheeler Schebler. February-March production and shipments represented 100 per cent gains over those of November, December, 1921. April production and shipment gain fully 25 per cent over April, 1921.

TIRE PRICES INCREASING

Philadelphia, April 15—Rubber tire companies are publishing new price lists which call for a slight upward revision in prices, according to reports of leading wholesalers. But little money has been made since the last price reduction, according to general opinion. Surplus stocks are well liquidated and the cost of production of new stock has increased slightly, necessitating another increase in cost to the consumer, they say.

TO BUILD ASSEMBLY PLANT

Detroit, April 18—The Gray Motor Corp. has signed contracts for the construction of an assembly plant at its site here, to have a capacity of about 200 cars a day. First shipments of the Gray car are scheduled for May 15. Gray engines for the Gray car are now being made at the Gray engine plant here.

NEW BECK-HAWKEYE MODELS

Cedar Rapids, Ia., April 18—The Beck-Hawkeye Truck Works is bringing out two new models, a two-ton C-10 to sell at \$2150 and a two and a half ton D-50 to sell at \$2850.

TO BUILD STAR FRAMES

New York, April 18—Durant Motors, Inc., announces that the frame contract for the new Star car has been awarded to the Parish & Bingham Corp. of Cleveland.

Says They Can Do Good Work and Keep Within the Law

Secretary of Commerce Tells Conference He Won't Co-operate With "Open-Price" Assn.

WASHINGTON, April 15—Trade associations, whose future has been somewhat clouded by doubt as a result of recent government investigations and court decisions, were encouraged here today by Secretary of Commerce Hoover to go ahead with legitimate activities for the promotion of better business. The secretary told more than 500 representatives of trade organizations who met with him at his invitation that the trade associations of the country have raised the standards of business ethics and performed a great many functions which have made for lower costs of manufacturing and distribution and in general for the public welfare.

The secretary not only gave official encouragement to the trade association idea but offered associations and their members the assistance of the department of commerce along information lines and asked their co-operation in assisting the department to collect and publish statistics of interest and benefit to business.

Hoover made it plain that the department of commerce could not advise trade association executives of the legality or illegality of things they were now doing. He suggested, however, that there were plenty of things they could do without getting into the "twilight zone" which might lead to government suspicion that they were attempting to stifle competition. He declared a large majority of the 2000 associations were performing entirely legal functions. He said association officers must decide for themselves whether they were in this class, as "the department of commerce cannot add to nor subtract from what the attorney general has said and has no intention of trying to interpret the law."

Secretary Hoover gave a suggestion of the government attitude, however, when he stated emphatically that the department of commerce would not co-operate with any "open price association," that is any association engaged in the exchange among its members of confidential price information. Outside the meeting itself developments also indicated that trade associations should consider the confidential exchange of cost information as being in the doubtful class from the standpoint of public policy.

The automobile industry was well represented at the meeting. J. Walter Drake, chairman of the board of directors

(Continued on next page)

Production of New Frontenac Car Expected to Start Soon

Models Designed by Louis Chevrolet Said to Have Aroused Interest of Dealers

INDIANAPOLIS, April 15—It is announced that the Frontenac Motor Co. of America, which is to manufacture the new four-cylinder automobile designed by Louis Chevrolet, has purchased the plant formerly operated by the Empire Motor Car Co. of this city. The plant was built originally and operated by the Federal Motor Co. and the purchase was made from that company.

The plant affords more than 100,000 square feet of space. The main structure is a one-story building of saw tooth construction. This will be used for machine shops and assembly. A three-story structure near-by will be used for the balance of the manufacturing plant. Beside this there is a two-story office building which will house the executive staff.

It is announced by director of the company that work will begin at once to put the building in shape for production, and that all necessary equipment and machinery has already been bought. Officials say that they expect the plant to be in operation within 30 days. The first sample cars are expected to be ready by the latter part of May, and production in a limited way will be in process by the latter part of June.

DURANT LETS STAR CONTRACTS

New York, April 18—Durant Motors, Inc., has informed its stockholders that it has entered into contracts with the Star Motor Co. of New York, the Star Motor Co. of Michigan and the Star Motor Co. of California to produce the Star car which will sell at \$348 in the divisional plants of Durant Motors and under the same management. The production schedule of the Star for the calendar year 1923 has been tentatively fixed at 200,000. The production schedule for Durant fours and sixes for next year has been placed at 80,000.

PROGRESSIVE FARMING INSTITUTE

Chicago, April 15—The Power Farming Bureau, which was organized more than a year ago to promote publicity in behalf of tractors, has been succeeded by the National Institute of Progressive Farming. Guy H. Hall, best known to the tractor industry as secretary of the Kansas City Tractor Club and manager of the tractor shows held in Kansas City, is manager of the new organization.

The headquarters of the new organization will be in Chicago. It is supported by tractor and farm implement manufacturers and by organizations supporting progressive and diversified farming movements. The several cattle associations are for the first time joining with the manufacturers for a general ad-

vancement of the better farming idea. The plan is that the information developed and broadcasted by this organization will be constructive for farming and not in any sense the ordinary publicity type.

George E. Fuller, who was in charge of the Power Farming Bureau, has not announced his plans.

Worthy Dealer to Get Plenty of Credit, Gov. Harding Says

Washington, April 14—Credit facilities for automobile dealers this year will be virtually unlimited to the dealer who is worthy of credit, according to a statement made here today to C. A. Vane, General Manager of the National Automobile Dealers, by Governor Harding, of Federal Reserve Board.

Banks have plenty of money, Governor Harding said, and are anxious to lend it where it will be productive. "But this is a period of settling business," the Governor went on, "and money in all lines will be available only to the man who is worthy of credit."

Pierce-Arrow and Lafayette Merger Being Worked Out

New York, April 14—Detailed plans for the consolidation of the Pierce-Arrow Motor Car Co. and the Lafayette Motors Co., are being worked out following a conference of bankers and officers at which the plan as agreed upon in principal. C. W. Nash, president of Lafayette and of the Nash Motors Co. will become chairman of the board of the consolidated companies while Col. Charles Clifton, chairman of the board of Pierce-Arrow, will serve as president. Nash will have charge of all operations.

The plans do not contemplate any immediate change either in the Pierce-Arrow or Lafayette lines. Both are in the higher class field. The Pierce-Arrow is powered with a six-cylinder engine and Lafayette with an eight-cylinder. The Lafayette phaeton sells for \$4,090 and the Pierce-Arrow for \$6,500.

Nash Motors will not be involved in the consolidation any more than it has been with the Lafayette company.

FRANKLIN PRICES REDUCED

Syracuse, April 18—Reductions ranging from \$450 to \$650 on its various models, effective immediately, are announced by the Franklin Motor Car Co. The list follows:

	Old Price	New Price
Roadster	\$2400	\$1900
Phaeton	2450	1950
Demi-coupe	2750	2100
Demi-sedan	2850	2250
Victoria Coupe	3200	2750
Brougham	3300	2750
Sedan	3450	2850

This reduction brings the Franklin cars to the lowest prices in the history of the six-cylinder type extending as far back as 1906, with the single exception of a four months period in 1916.

Cars Under \$2500 Lead In New York Sales Increase

Total Registration of New Cars Nearly Double of Those of Same Period Last Year

NEW YORK, April 15—New passenger cars registered in the first three months of 1922 in 10 counties in and around New York numbered 11,792 as compared with 6330 in the same period last year. March registrations also showed a gain of almost three to one over January and February, respectively.

Ten cars in the medium and low priced classes have registered more than 200 each since January 1, four of these having more than 1000, one almost 1000 and the remaining five running from 225 up to 300. In the high-priced class seven cars have registers of more than 40 for the three months.

A summary of registrations for the 10 counties, taken from the monthly report of Sherlock & Arnold, publishers of the Automobile Sales Analysis, is as follows:

Cars Below \$2500			
	1922	1921	
January	2019	483	
February	2231	1409	
March	6354	3396	
Total	10,604	5288	
Cars, \$2500, and Above			
	1922	1921	
January	283	145	
February	274	210	
March	632	487	
Total	1188	842	

HOOVER FAVORS ASSOCIATIONS

(Continued from preceding pages)

of the Hupp Motor Car Corp., and A. J. Brosseau, president of Mack Trucks, Inc., director of the National Automobile Chamber of Commerce, appeared with Alfred Reeves, general manager, and George F. Bauer, of the foreign trade department, for the N. A. C. C.; C. A. Vane, general manager, represented the National Automobile Dealers Assn.; M. E. Heminway, the Motor and Accessory Manufacturers Assn.; S. Duncan Black, of the Black & Decker Mfg. Co., appeared as a director of the Automotive Equipment Assn., and William Butterworth, of John Deere & Co., for the National Association of Farm Equipment Manufacturers. Pyke Johnson, of the N. A. C. C. Washington office, was present.

TORBENSON CO. REORGANIZED

Cleveland, April 18—Cleveland interests headed by J. O. Eaton, former president and general manager of the Torbenson Axle Co., have acquired the interest in that company formerly owned by the Republic Motor Truck Co. and have reorganized the concern.

Educational Committee For Highway Transport Named

Program for Next Washington Conference Includes Opportunities in Automotive Mechanics

WASHINGTON, April 18—The appointment of the Educational Committee of the Highway and Highway Transport Committee, which met here on April 7, is announced by the National Chamber of Commerce.

The personnel of the Committee is as follows: T. H. McDonald, Chief of Public Roads; Roy D. Chapin, of the National Automobile Chamber of Commerce; Dean F. L. Bishop, University of Pittsburg; Col. W. Boggs of the War Department; Pyke Johnson, Washington representative of the N. A. C. C., and Dr. Walter C. John, acting Director of the Committee.

Plans were formulated by the committee for the dissemination of educational propaganda for good highway transports through the education of pupils in the 5th and 6th grades of the public schools, of which there are 16,000,000 according to the recent census.

The Educational Committee met with the two national Program Committees to outline programs for Highway Engineering and Highway Transport Sections of the proposed second National Conference on the educational aspects of Highway Transport.

Oct. 20 to Nov. 1 was selected as the tentative date for the Conference, to be held in Washington. It was proposed that the conference should last three days.

The program is to be divided into three parts, as follows: The first part to be devoted to the field of opportunity in the automotive mechanics, highway transport and highway engineering; the second part to the requirements which students must have to qualify for this field, and third, the contents of courses.

5025 NASH CARS FOR APRIL

Kenosha, Wis., April 18—C. W. Nash, president of the Nash company, who has just returned from an extensive trip through the northwest, west and southwest, reports that the company has orders for the delivery of 5025 cars in April, as compared with 3307 in the corresponding month last year. He said sales for the first quarter were 50 per cent greater than for the corresponding period last year.

ST. LOUIS DEALERS ELECT

St. Louis, April 18—H. F. Fahrenkrog, manager of the Kardell Motor Car Co., Reo distributor, was elected president of the St. Louis Automobile Dealers' Assn. at the annual election. H. W. Spalding, president of the Spalding Motor Co., Durant dealer, was elected vice-president; W. R. Ellis, manager of the

St. Louis branch of the J. I. Case Threshing Machine Co., treasurer, and the following directors were elected: Philip H. Brockman, De Luxe Automobile Co.; George Weber, Weber Implement and Automobile Co.; C. A. Cole, F. C. Meyer Motor Co.; Webster Colburn, Dorris Motor Car Co.; H. Claude Merry, Wilson Motor Co.; and Herman L. Schnure, Velle Automobile Co.

The meeting was attended by representatives of fifty-six automobile distributing firms. The retiring president, R. C. Frampton, of the Hudson-Frampton Motor Car Co., introduced Fahrenkrog, the new president, who outlined the policies he expected to pursue in his administration.

The State Automobile Association Committee, through Harry Newman, the chairman, recommended the formation of the Mississippi Valley Automobile Trades Assn., to be made up of organizations in the St. Louis district, one member to be the St. Louis Automobile Dealers' Assn.

Gives New Suit With Each Used Car Sold

DALLAS, Tex., April 15—What's the use of having a car without a new suit? That is the question the Oakland Motor Car Co. here asked itself. It answered the question by saying: "A car and a new spring suit go together."

Then the Oakland Company put on a new sale. It had 30 used cars to dispose of. It told the public through the daily press that every man buying a used car would be given an order to the tailor for a new suit of clothes. The 30 cars were sold and the tailor made 30 suits of clothes which the Oakland Company paid for. In this way the men selected their cars and also their suits and made one trade do them both. It was the first time a combination "car and suit of spring clothes" had been offered in Dallas and the dealers declare it developed the fact that the sterner sex is susceptible to "throw-ins" and wouldn't care at all if the old days of giving a pair of socks with every pair of shoes would return.

FEDERAL AID BILL PENDING

Washington, April 18—Introduced as a substitute for the rider on the Postoffice appropriations bill, the Dunn bill providing for Federal aid highways, has been reported out of the House committee on roads. The question of highway appropriations has brought about differences between the two legislative bodies. The Senate Postoffice committee attached the \$50,000,000 appropriation for good roads as a rider to the Senate Postoffice appropriations bill. The bill is now in conference but the situation is somewhat complicated by the substitute measure now pending.

Insurance Men Discuss Ways To Reduce Automobile Thefts

Suggest Inspection of Cars By State Before Issuance of Licenses

CHICAGO, April 15—A conference to discuss means of reducing the number of automobile thefts throughout the country was held in Chicago this week by managers and representatives of the various automobile insurance theft bureaus and representatives of the Western Automobile Underwriters' Conference.

The meeting was suggested some time ago by the national theft committee of the National Automobile Underwriters' Conference. The opinion was held among those at the conference that automobile stealing will continue to increase until thieves are more severely punished than they have been in the past. There was considerable discussion of the Dyer Law which makes it a Federal offense to transport a stolen car from one state to another. Under this law the automobile thief apprehended in any part of the United States may be returned to the state in which the offense was committed without the necessity of extradition.

It was suggested that automobiles should be inspected by the state before licenses are issued and that this would result in reducing the number of thefts. It was said that in many cases automobile thieves have been released upon payment of a light fine or after serving a short sentence. In many cases it was said the reluctance of the insurance companies to push the case against the automobile thieves has resulted in turning loose countless numbers of them.

REIMPORT BILL DELAYED

Washington, April 18—Consideration of the Graham resolution, placing a 90 per cent ad valorem tax on all reimported goods, was postponed when it came up in the Senate, by objection of Senator King of Utah, who insisted that there was more important legislation pending.

The resolution, which has been endorsed by the automobile and supply dealers, as well as by practically every national association of retailers and manufacturers, would prevent the dumping and underselling of cheaply bought Government war supplies, on the American market, after they had been purchased abroad.

WILLYS-KNIGHT CHANGES

New York, April 18.—Willys-Knight cars are now coming through from the factory with a new type of fuel feed, the G. G. This operates on a vacuum principle and is made by the Zorri Corp., 1737 Broadway, New York City.

Earl Reorganization Plan Approved; Production Begins

Creditors' Claims Deposited With Committee — Banks Grant Credit for Operation

JACKSON, Mich., April 15—The re-organization committee of the Earl Motors, Inc., of which Ralph Van Vechten, president of the Continental & Commercial Bank of Chicago, is chairman, has announced that the re-organization of the Earl company will proceed at once.

Clarence A. Earl will continue as president. Geo. C. Scobie has been elected vice president and will have charge primarily of the company's financing management. Increased production has already started at the factory and about 1000 men will be employed. The statement issued by the committee is as follows:

"Substantially all of the creditors of Earl Motors, Inc., have agreed to deposit with the reorganization committee the necessary assignment of their respective claims and the plan of reorganization and readjustment was declared operative today by the committee. In addition to the consent of the creditors, satisfactory arrangements have been completed with banks in Chicago, New York and Jackson, for substantial lines of credit to enable the company to carry on its manufacturing operations in good volume.

"With the co-operation of the committee, the following board of directors has been elected: John W. O'Leary, vice president Chicago Trust Co.; Rumsey W. Scott, vice president Chemical National Bank, New York; Geo. C. Scobie, secretary Hayes Wheel Co.; Clarence A. Earl, president of company; L. S. Wescoat, treasurer of company; J. Fletcher Farrell, vice president Sinclair Consolidated Oil Co., New York; Frank H. Joyce, vice president American Auto Trimming Co., Detroit; W. S. Sparks, president Sparks-Withington Co., and N. S. Potter, president Jackson City Bank.

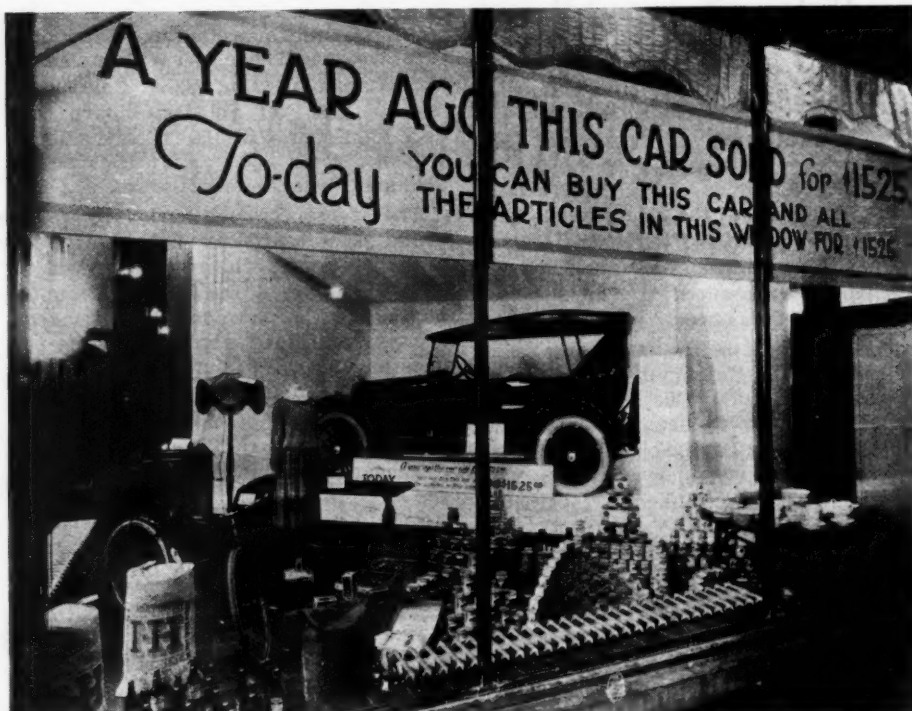
"A sufficient amount of common and preferred shares has been pledged for deposit in a voting trust, which will insure the certainty of the new directorate.

"Clarence A. Earl will continue as president of the company, devoting particular attention to the development of the sales organization.

"George C. Scobie, recently with Hayes Wheel Co., and formerly with Price, Waterhouse & Co., has been elected vice president and comptroller by the new board and will have charge primarily of the company's financial management in connection with its operations.

"General praise has been accorded to the new model Earl which Clarence A. Earl has so successfully developed. The company, as re-organized, is practically free from current indebtedness and its

Striking Display of a Kansas City Dealer



KANSAS CITY, April 15—A stimulating show window display arranged by the Nash Sales Co., of Kansas City, exhibits a touring car which a year ago sold for \$1525 surrounded by a great quantity of food, clothing and household

articles. A large line across the window states that the entire display, including the automobile, can now be purchased for \$1525, the price of the car alone a year ago. This graphic argument is more convincing than sales talk.

plant entirely unencumbered, with a large inventory and banking credit sufficient for its current needs."

President Earl stated that the company has orders for about 2500 cars for delivery in April and May. The phaeton is now priced at \$995.

GOOD SHOW AT QUINCY

Quincy, Ill., April 13—Completed records of the Fourth Annual Automobile show in Quincy set new records for both attendance and sales of cars. Almost 8000 persons paid admission to the show this year, which is three times any previous record. Fifty cars were sold as against 20 of the highest previous records.

Following this successful show, the Quincy Automobile Trades Assn. is discussing the advisability of employing a paid, full time, secretary with the understanding that this man might be used in the promotion of the road campaign in connection with the Chamber of Commerce work.

NEW CLYDESDALE TRUCK

Clyde, O., April 15—The Clydesdale Motor Truck Co. is bringing out an all-steel truck which has a total capacity of 6850 lbs. including the weight of the chassis, which is 3100 lbs. This gives a carrying capacity of body and load of 3850 lbs. The price is \$1485, which includes the starting and lighting system.

West Side Chicago Dealers Hold Show; 75 Sales Made

Chicago, Ill., April 15—The West Town Auto Dealers' Assn., this week held its first show, which has proven a boon to dealers in that section of the city.

Fred B. Fugitt, secretary of the organization, said that over 75 sales were made at the various booths in which all of the popular makes of cars were represented. The total membership of the association had displays and the salesmen reported, in addition to the many sales, intense interest on the part of the many spectators.

REPORT OF PEERLESS TRUCK CO.

Cleveland, April 8—The annual report of the Peerless Truck & Motor Corp. as of Dec. 31, shows current assets of \$7,065,665, against current liabilities of only \$825,682. The surplus at the close of the year was \$5,257,880. The income from sales was \$12,055,904 and the cost of sales was \$12,103,636, leaving a net loss of \$47,742 on this item. The entire net loss for the year was \$103,665.

SHOW SPEEDS UP SALES

Youngstown, O., April 15—The Youngstown Automobile Show gave marked impetus to the sale of motor cars in this city. Actual sales at the show numbered 128 cars of which only 36 were trade-ins.

Service Clinches the Sale, Says General Motors Man

**Member of Advisory Committee
Tells Oakland Service Managers
to Satisfy Customers**

PONTIAC, MICH., April 18—"When a man buys an automobile, he has two things in mind and never forgets them. The first is the price he paid for the automobile and the second is the promise the salesman made to him concerning upkeep and service. It was these promises that helped to induce the man to purchase the machine. See to it that these promises are lived up to."

J. H. Newmark of the advisory staff of the General Motors Corp., so advised the 100 service managers of the Oakland Motor Car Co. assembled from every city in the country from the Atlantic to the Pacific coast in his address at their final session at the Oakland factories in Pontiac.

"You are the long arm of the sales department. After the car is sold the sale is only half made. You clinch the sale when the owners of these cars return to you for service on them.

"The future of your business, of any business, depends on service. It is a much used word but it is all important. We live by service. Everything we do in life is service—for somebody.

"The reputation of your service spreads like wildfire—whether good or bad. At times it seems quicker than wireless. And you should guard zealously that reputation.

"Build confidence into the hearts of your service men. Your company is absolutely honest, absolutely sincere in making a machine that is right, that gives an honest dollar's return for every dollar invested by the purchaser. Sell these honest goods with the same enthusiasm that the factory makes them."

The greater part of one morning was devoted to an open forum discussion. Mr. Otis, assistant manager of the service department at the plant, went into detail on the various tools and equipment the factory found to be most efficient for Oakland service and told what the factory was doing to work out service cost, to the end of finally having a flat-rate-service plan in operation throughout the country.

GARY TRUCK REORGANIZED

Gary, Ind., April 18—The assets of the Gary Motor Truck Co., which has been in receivership for several months, have been purchased by Frank Dawson and three associates, who will reorganize the corporation under the name Gary Motor Corp., with a capital of \$1,000,000. Dawson is president and general manager of the new company. T. H. Cooper, who was Kansas City distributor for Gary trucks, is secretary and treasurer, John Griffin is vice president, and Harry

Searles is the fourth director. The property was purchased at trustee's sale for \$110,000.

Dawson announced that the company would continue the same line of trucks that the old company manufactured, at reduced retail prices, and would add a light delivery truck to be sold at a popular price. Following the sale, the factory was reopened and a number of men put to work. It is planned to distribute the trucks through branches to be opened in the larger cities.

The models and the old and new prices are as follows:

Model	old price	new price
F 1½-ton	\$2600	\$1675
I 2-ton	2900	2150
J 2½-ton	3800	2550
K 3½-ton	4900	3550
M 5-ton	5900	4000

Court Holds Garage Owner Liable for Damage to Car

Buffalo, April 15—A garage owner is responsible for automobiles stored in his keeping so far as damage by freezing is concerned, it was ruled by Justice Alonzo in supreme court here. D. R. Wheeler brought an action against the Glidden garage seeking damages because freezing caused damage to his machine while it was stored. The court awarded the damages sought.

NEW ORLEANS USED CAR MARKET

New Orleans, La., April 15—The used car situation in New Orleans has been greatly simplified by the Automobile Dealers' Assn. through the adoption of a plan by which each dealer makes a report of his weekly trading in used cars. With the adoption of this plan, dealers of the Crescent City are now buying second-hand cars with their eyes open to the approximate value of the cars, based on local market conditions; and as an average, used cars are moving with the desired regularity, and dealers are making a fair profit.

AMERICAN PRICES REDUCED

Plainfield, N. J., April 18—Reductions in the prices of its various models are announced by the American Motors Corp. They follow:

	Old price	New price
5-passenger phaeton	\$2195	\$1850
7-passenger phaeton	2195	1925
4-passenger sport	2250	1995
5-passenger sedan	3150	2695

USED CARS TO BE APPROVED

Chicago, April 18—Used cars which will be exhibited at the Used Car Show at the Coliseum April 26 to May 4 will be inspected and approved as to condition by a committee of the Chicago Automobile Trade Assn. Dealers will also be permitted to display these approved cars in their salesrooms before and after the show. The show will be confined to used cars and accessories and dealers will not be permitted to distribute printed matter advertising new cars.

Demands Investigation of Lincoln Motor Co. Contracts

**Member of Advisory Committee
for Appointment of Committee
—Other Contracts Questioned**

WASHINGTON, April 18—Threatening the impeachment of Attorney General Daugherty for his "failure to prosecute the case of the Government against the Lincoln Motor Co.," Congressman Roy O. Woodruff, of Bay City, Mich., Republican, made a sharp attack upon the War Department, Department of Justice and former Attorney General A. Mitchell Palmer. Woodruff introduced a resolution asking for the appointment of a Congressional Committee to investigate the Lincoln Motor Co. contracts and other government contracts made during the war.

The Attorney General's failure to investigate contracts made with the war department, Woodruff charged, has resulted in defrauding the government out of millions of dollars.

"Given Air Service Contracts"

"The Lincoln Motor Co.," he said, "during the war received large contracts for the air service, and has been shown by the Government audit to have been overpaid to the extent of \$9,188,561.90.

"This concern some time ago was thrown into the hands of a receiver. The receiver has sold this property to Henry Ford for \$8,000,000 cash which the receiver now holds.

"This case had been turned over to the Department of Justice and by it referred to the District Attorney at Detroit for necessary action and suit had been started in the United States District Court against the receivers of the Lincoln Motor Company.

"We find the policy pursued in the past in some other case, now being pursued by the Department of Justice in the case of the Lincoln Motor Co.," Woodruff said, declaring that the case of the Lincoln company "has been taken out of the hands of the District Attorney at Detroit and has been returned to the department here."

DAUGHERTY TAKES CHARGE

Washington, April 18—It was announced at the department of justice that Attorney General Daugherty will personally investigate the war contracts of the Lincoln Motor Co.

MOON HAS ITS BEST MONTH

St. Louis, April 19—March sales were the best in any previous month in the history of the Moon Motor Car Co., according to Stewart McDonald, president, who states the sales for last month were 50 per cent greater than for March 1921, and 20 per cent greater than for March, 1920.

IN THE RETAIL FIELD

Studebaker agency, franchise and distribution of Dallas, Tex., has changed hands. Clarence R. Nachtreib is the new owner.

U. S. L. Battery Service Station, Memphis, has purchased the building in which they are located and will make a permanent home of it.

Stockwell Motor Co., Nashville, Cadillac distributors, has acquired more territory.

Studebaker Detroit branch has set a goal of 500 as the total sales for the coming month.

Martin Parry Co. is opening a New Orleans branch with A. Mitchell in charge.

Seiberling tire, manufactured by the Seiberling Rubber Co., of Akron, Ohio, is to make its appearance in Texas. A branch of the house will be located in Dallas for distributing the products in the southwest. An active sales campaign will be staged in Texas.

L. B. Ulrey Motor Co., King City, Calif., has opened its new salesroom at Oakland, where it will handle the Leach 999, a California made car. The Ulrey company, which also handles the Studebaker, has exclusive sales rights for the Leach in Alameda, Contra Costa and San Joaquin counties, and will open another showroom in Stockton shortly. It is affiliated with the Golden State Motors Corp., state Leach distributors, and will take on any other lines handled by them.

Anger-Chevrolet Sales Co., Milwaukee, has been incorporated for \$100,000 to take over the retail distribution of the Chevrolet line in Milwaukee and four adjoining counties. Bert F. Anger, formerly head of the Anger Engineering Co., a Milwaukee Ford dealer, is president and general manager.

R. H. Thieman Auto Co., Ford dealer, Sheboygan, Wis., has been appointed Lincoln dealer in the same city.

Hamacheck-Blesse Buick Co., Manitowoc, Wis., has plans for a one-story garage, display, sales and maintenance building, 50x140 ft., to cost about \$32,000 complete.

J. W. Osborn, Waupaca, Wis., will build a two-story garage and maintenance station, 58x100 ft., estimated to cost \$35,000.

Hudson-Essex Sales Co., Madison, Wis., is a new \$10,000 corporation formed by Philip Horstmeier, Glen W. Stephens and T. A. Waller, to deal in the Hudson and Essex, conduct a garage and maintenance station, sell automotive equipment, etc.

Cook & Drogsvold is the name of a new partnership which has engaged in business at Stoughton, Wis., as dealers in tires, batteries and general automotive equipment.

Rademacher & Jaeger Co., Milwaukee, distributor of the Paterson, has changed its corporate name to Rademacher & Meyer Co. Frank J. Meyer is secretary.

Hamermik Motor Co., Fond du Lac, Wis., Moon and Elgin dealers, has added the Chevrolet.

Columbus (Wis.) Auto Repair & Paint Co. has been organized by Nelson Zwick and T. F. Thiel to do a general maintenance, painting and trimming business.

Grand View Motor Co., Grand View, Wis., is a new \$15,000 corporation formed by S. J. Darwin, Fred J. Gregoire and V. C. Wallin, all of Grand View, to deal in new and used cars, operate a garage and maintenance station and sell automotive equipment.

Anderson Vehicle Co., Fond du Lac, Wis., Paterson and Auburn dealer, has been granted the Franklin franchise.

Omaha branch of the Lee Tire & Rubber Co. has designed a board having over 100 30-penny specially sharpened and hardened nails projecting through the top over which a car equipped with Lee Puncture-Proof tires is driven to demonstrate that they are actually puncture proof.

Independence Auto Sales Co., Chicago, has been incorporated at \$15,000 to deal in Studebakers, accessories and general automotive equipment. Incorporators are H. L. Seigel, Nathan Greenburg and Abraham Greenspahn.

Glenwood Motor Sales Co. has established offices in Chicago, following incorporation for \$15,000. As yet there has been no permanent sales location made but the Glenwood company will deal largely in used cars, accessories, etc. The incorporators are Samuel, Philip and Albert Slavin.

Preston Motors Corp., Birmingham, Ala., this week shipped three Premocars to New Zealand, the shipment going by way of New York. The three touring cars, with carmine body and white wire wheels, are equipped with right hand drive due to foreign traffic regulations.

Vesper Buick Automobile Co., St. Louis, Mo., has recently acquired a new corner as the site for a building to be erected some time in the future to provide facilities for the expansion of the company's activities.

Kinsey Motor Co., of Davenport, Iowa, has been appointed distributor for the Columbia automobile in the Davenport territory.

Sprague Tire & Rubber Co., of Omaha, has established 10 branches for the sale of its tires here. Its figures say it enjoyed a \$500,000 business last year, and having planned an advertising campaign that will double the previous year's business, the company was forced to look for additional outlets.

Leo A. Bird has organized the Bird Motor Co., Salt Lake City, to take over the distribution of the Stanley Steamer. Bird has been sales manager for the Taylor Motor Car Co. for several years.

Binford-Kimball Motor Co., Ogden, Utah, has changed its name to the Wattis-Kimball Motor Co.

Springville Garage, Springville, Utah, has taken over the distribution of the Ford car in this territory.

Spokane Chandler Co., Spokane, Wash., has changed its name to the Chandler-Cleveland Cars Co., according to R. K. McIntosh, president of the new company. Other officers of the company are G. T. Brown, secretary and W. E. Mitchell, director.

Paragon Oil & Gasoline Co., Oshkosh, Wis., has been incorporated with \$25,000 capital to wholesale and retail petroleum products and automotive equipment. The incorporators are Louis Leibenson and Joseph Drasal, of Oshkosh.

Elmer Smith Auto Co., Fond du Lac, Wis., is a new \$15,000 corporation organized by Elmer and Rose Smith and Lee Bedberry to deal in motor vehicles, equipment, etc.

Lindow Tire & Rim Co., Milwaukee, capitalized at \$10,000, has been granted a charter to deal in tires, vulcanizing and other equipment and accessories. The incorporators are Guy C. Lindow, M. Jovanovich and M. W. Lindow.

J. G. and Gordon Dudley, Shelby, N. C., have taken the agency for the Studebaker car, succeeding Hoey and Lackey. A new brick building will be erected and a complete maintenance station operated.

Carolina-Marmon Co., Greenville, S. C., has been organized by A. B. Yeargin and others and becomes state agent for the Marmon car. The company will have sales and maintenance stations in both Greenville and these two cities will also be distributing points for the balance of the state.

P. M. Busick has bought interest of S. P. Penny in the automobile firm Penny-Busick, Greenville, S. C., and the business will hereafter be conducted by Busick, now sole owner of the agency, which handles the Ford car. The company is erecting a handsome new building. Penny takes a Ford contract in another city, not yet announced.

S. & R. Motor Co., Charlotte, N. C., recently organized here, has opened a garage. W. R. Sample and E. E. Redfern are principal owners of the new plant.

Covey-Ballard Motor Co. is the name of a new concern in Salt Lake City, Utah, the principals of which are Stephen M. Covey, president of the Covey Investment Co., and Melvin R. Ballard, circulation manager of the Desert News, who has resigned to enter the motor business.

Durant Motor Co., Salt Lake City Utah, has appointed the Inter-Mountain Motor Car Co. as distributors for this territory.

Lexington Motor Co., Salt Lake City, Utah, has appointed Ralph C. Schayer, well known in Salt Lake City motor circles for the past seven years, as manager in this city.

Birmingham Motor Co., Birmingham, Ala., Buick dealer, is leading the south, according to announcement by the Atlanta branch of the Buick Motor Co. A letter from the Atlanta branch to the local company declares that "sales by your organization during the month of March are the best among all the dealers under this branch."

Blue Cross Motor Sales Co., Chicago, has incorporated with \$25,000 capital. It will act as an exchange for used cars and has secured a Moon agency. The incorporators are Maurice Silken, Charles Knaler, Samuel Colberg and C. W. Scheaffer.

Midwest Tire Manufacturers Report Larger Production

One Maker Gradually Increasing Prices—Some Operating 24 Hours a Day

CHICAGO, April 15—At the monthly meeting of the Midwest Rubber Assn. here this week several manufacturers reported noticeable increases in tire business and one manufacturer said he was gradually increasing the price of his tires. About 30 members of the association and a number of guests attended the meeting, several western and mid-western cities being represented.

One manufacturer who a year ago last January, made only 500 tires in the whole month, said his production is now about 750 tires a day. Several others reported 24-hour operation with production of 1000 or more a day. One maker said his distributor at Atlanta, Ga., has sent in greatly increased orders in the last few weeks and reported a business improvement of nearly 200 per cent in the last few weeks in that section of the South.

Good Business Spreading East

W. W. Wochter, president of the association, who conducts a tire manufacturing business at Omaha, Neb., said the business improvement was coming from the west and spreading toward the east. He declared that the small manufacturers, who largely compose the Midwest Association, were taking business from the large makers because of willingness to do business at a reasonable profit and because of their ability to promptly adjust themselves to changed conditions.

CADILLAC SETS SALES RECORD

Detroit, April 15—Encouraging news on the revival of business is found in the report just issued by the Cadillac Motor Car Co. This company has completed the best January, February and March business in its 20 years' experience. Cadillac officials state that every indication points to increasingly good business for the second quarter.

LINCOLN MOTOR CAR CO.

Detroit, April 15—MOTOR AGE was in error in its issue of April 13 in giving the name of the newly incorporated successor to the Lincoln Motor Co. as the Lincoln-Ford Motor Car Co. The name of Ford is not included in the title of the new corporation which is the Lincoln Motor Car Co.

KREBS-COLLIER TRUCKS

Bellview, O., April 18—A line of trucks to be known as the Krebs-Collier will be built by the Collier Motor Truck Co. for the Krebs Motor Truck Co. The capacity and prices of the new models follows: $\frac{3}{4}$ ton \$1,260; 1 ton \$1,565; $1\frac{1}{2}$ ton \$2,125, $2\frac{1}{2}$ ton \$2,375; $3\frac{1}{2}$ ton \$2,975.

Farmer Back In Prospect Line at Western Show

Davenport Show Raises Spirit of Dealers, Strong Talks Bring Sales

DAVENPORT, IA., April 15—The Iowa farmer, still a little groggy from the whirlwind economic cyclone he has passed through in the last few months, is recovering his financial equilibrium. He's still the sturdy automobile "prospect" but a customer upon whom the most forceful "ask 'em to buy" argument is necessary.

That, at least, is the general opinion of the Davenport Automobile Exhibitors' Assn. members who emerged radiant and visibly cheered from their first automobile show which was staged in the Coliseum last week. Disheartening weather affected the attendance which fell below the 10,000 mark, but the whole effect of the show was to disperse the gloom clouds which threatened the spring business. A score of dealers with nearly half a hundred models of cars, ranging from the low-priced runabout to the most expensive and luxurious of the new sedans, got a fine contact with the pulse of their possibilities.

It was Davenport's first automobile show in six years and marked initial exhibit of local dealers under their own organization. Heretofore the Iowans had been members of the Tri-City Auto Trades Assn., which gave its last show two years ago. Size of the organization, however, made it impossible to secure a location sufficiently large for fair membership representation and it was to overcome this handicap that the Davenport dealers undertook an independent show.

Throughout the Davenport territory the farmers' withdrawal from the buying market, his financial situation and his prospects, had dealt the automobile business a severe blow. It was to the farmer buyer that the Davenport exhibit was directed.

And the Iowa farmer—in his exasperating way—pulled on his Sunday boots, lined up his resources in a manner which warmed the Federal reserve bankers, and looked Mr. Dealers' wares over. He brought a keener judgment with him this time and he measured prices in bushels of corn—but he talked business and he put heart into the dealers.

The city folks, who had been complaining all spring that they were ready to go in industry when the farmer started to plow his fields, followed the farmer's example readily.

Performance of the machine, its rock-bottom value and a business-like estimate of offerings being made, marked spirit of the buyers but most of the dealers took this challenge to their sales-

manship as proof of the sincerity of the "prospect" and concentrated on a "straight-from-the-shoulder" selling talk. Before the week was half over show managers received reports from nearly every dealer that his floor sales had repaid him for his efforts and that the list of future buyers gave a busy outline for the remainder of the season.

HARTZ WINS GOLDEN GATE DERBY

San Carlos, Cal., April 16—Harry Hartz, who for several years was mechanician for Eddie Hearne, came to the front with the stellar drivers of the gasoline circuit by winning today's 150 mile Golden Gate motor derby, before an audience of 30,000. Hartz drove a Duesenberg and covered the distance in 1:20:38, an average of slightly over 111 m. p. h.

Jimmy Murphy, winner of last year's Grand Prix in Europe, finished second, being just half a lap behind Hartz. Roscoe Sarles was third man to finish, he being a half lap behind Murphy. Both Murphy and Sarles drove Duesenbergs. The race was a duel between Hartz and Murphy.

For several years Hartz was champion juvenile driver, winning many races in a small car using a twin-cylinder motorcycle engine. He rode with Hearne until last Thanksgiving Day's race at Beverly Hills speedway and since has finished in the money in every race he started. He is twenty-three years old.

An added feature on today's program was an exhibition 10 miles in a stock chassis Daytona model Paige, driven by Eddie Cooper. He broke the world's record for the distance (stock chassis) setting a new record of 6:21, which is at the rate of 93.24 m. p. h. The old record was 91.9 m. p. h. One of his miles was clocked at 94.8 m. p. h.

SPRING TONIC COURSE

Indianapolis, April 15—The Indianapolis Automobile Trade Assn. is holding a Spring Tonic Course for salesmen and executives this week. O. H. Chamberlain, Jr., of Detroit, has been giving a series of lectures covering various points of the trade and various sales topics. Approximately 400 dealers and salesmen have attended each lecture. Wednesday evening special attention was paid to the used car selling, and covered some of the points of weak methods of salesmen and executives. Just to show that the members of the local association have not been asleep on new methods for used cars, Manager John B. Orman told of the sale of 276 used vehicles by 14 dealers in the period from March 10 to April 10.

GOOD SHOW AT CUMBERLAND

Cumberland, Md., April 15—The Automobile Dealers' Assn. of this city recently held a decidedly successful show in the new Ford building. The display was visited by several thousand persons. About 40 makes of cars were displayed.

Believe Gain in Business Is Steady, Healthy Growth

Automotive Men Form This Opinion After Conference With Head of Federal Reserve

WASHINGTON, April 15—Impetus to the movement on foot by national organizations to advertise their products abroad, through the medium of educational moving picture films, was given when 25 national associations met in Washington with the Department of Commerce, as the initial movement of the idea.

In the automotive field it is proposed that educational films be made showing every phase of the manufacture of automobiles, its utility features and the importance and economics of highways transportation.

Attending the meeting were some 40 manufacturers of films, who were invited to participate by the Department of Commerce in order that they might give the delegates the benefit of their experience in the film end of the details.

The delegates, while here, met with Governor Harding, of the Federal Reserve Board, and discussed credits and business conditions throughout the country, especially as they affect the automotive industry.

The consensus of opinion of the delegates, following the interview with Governor Harding is that the present gain in business "is a steady, healthy growth and is not a spurt."

In discussing the outlook for the automobile industry Reeves declared that it was one of the brightest years that the industry had anticipated for some time.

"The coming year is one for conservatism in plans," he said, "but the general basic conditions and the prospects of business in other lines and the improved condition of the farmers warrant the belief that this year should be much better both in cars and trucks than was 1921."

MOTOR TRUCKS FOR RAILROADS

Cleveland, April 18—A good demand for motor trucks to operate on railroads is reported by the White Co. The company reports the following railroads operating White trucks: LaCrosse & South-eastern Railroad Co., Minneapolis; Verde Tunnel & Smelter Railroad Co., Clarkdale, Arizona; Mt. Hood Railway, Hood River, Oregon, and the Tennessee Midland Ry., operating between Franklin and Mt. Pleasant, Tenn.

DORT INCREASES TO 2000

Detroit, April 19—Dort Motor Car Co. will increase its schedule to 2000 cars for May. The inventories of the company will be brought to a low figure by early summer under the impetus of present business.

BUSINESS NOTES

Philadelphia battery houses are finding great profit in new radio fad, many of the companies having gone into exclusive production of the instruments.

Active Sales Co., Chicago, has been incorporated for \$20,000 and will deal in accessories and equipment.

Link Belt Co., Philadelphia, has brought suit against the General Motors Corp. for \$1,250,600 damages, charging that a contract to make parts for the Samson tractor had been changed, causing loss to the belt company.

Butler Savings & Trust Co., Philadelphia, has been appointed temporary receiver for the Western Pennsylvania Oil Co. Action was taken by Mrs. H. S. Strange and other stockholders.

Gasoline Tax Law enacted by the state legislature of Florida has been declared invalid by the supreme court.

Dallas Automobile Trades Assn., Dallas, Tex., has completed plans for incorporation.

Keystone Tire Co., Houston, Tex., was incorporated recently and will handle several makes of tires for this territory.

St. Louis Branch of the White Co. has under construction a new home which will also be occupied by agents for Ford, Dorris, Case, Chevrolet, Goodyear tires and Johnson locks.

White Co., Memphis, will have larger quarters. Construction will begin soon.

Bloomington, Ill., maintenance stations have reduced prices generally. A slight decrease in wages also went into effect.

Beach Motors, Ltd., Ottawa, Can., have started construction on their new building.

Mitchell Specialty Co., Philadelphia, announce the election of J. H. Mitchell as treasurer and general manager. Reorganization plans have been completed.

Buffalo Body Corp., Buffalo, N. Y., was damaged to the extent of \$10,000 by fire recently.

Adria Motors Co., Buffalo, has changed hands, having been taken over by T. J. Dailey & Son.

Universal Tool Co., New Jersey, has purchased the interests of Universal Tool Co. of Michigan.

Vellie Motors Corp., Bloomington, Ill., has filed a certificate of decrease in stock with the secretary of state. Par value of common stock has been lowered from \$25 to \$10.

Duplex Storage Battery Co., Beaver Dam, Wis., manufacturer of Duplex storage batteries, has filed a voluntary petition of bankruptcy, scheduling its liabilities at \$74,462 and claiming assets of \$58,895. Unsecured claims amount to \$67,497. The first meeting of creditors will be held today, April 10, in the office of Referee C. H. Forward at Oshkosh, Wis.

Moline (Ill.) Automobile Dealers have formed a permanent organization "for promotion of their trade interests" and will hold fortnightly meetings. H. C. Stahl is chairman and Carl Blomgren secretary of the new club.

Milwaukee circuit court has approved the sale of the assets of the Seymour Laboratories Units, Inc., Milwaukee, to G. W. Stratton for \$39,000. The Seymour company was organized 18 months ago to manufacture piston rings and other automotive parts and specialties. Some time ago receivership proceedings were instituted by the Matthew Addy Co., Cincinnati. The property embraced a gray iron foundry, machine shop and auxiliary buildings at Milwaukee.

Hayfield wheel, an automobile wheel equipped with the pneumatic tube around the hub instead of the rim, will be distributed throughout the northwest territory by the Northwest Hayfield Wheel Co., Spokane, Wash., which has been

organized with a capital of \$10,000 by F. E. Pope, of Elmendorf & Pope, J. C. Pritz, F. T. McCroskey, George C. Howe and L. R. Hamblen.

Hood Rubber Products Co., Watertown, Mass., announces the opening of a direct factory branch at Memphis, Tenn., to give improved service to dealers in that and adjacent states.

Vacuum Oil Co., Buffalo, manufacturers of automobile oils, has placed production at its Olean plant on a full time schedule, employing 400 persons.

Metal Stamping Co., New York, manufacturers of Lion bumpers, reports that March was the biggest month in its history. The output of bumpers exceeded 34,000.

The Summit Rubber Co., Akron, Ohio, has been chartered with a capital of \$125,000 to manufacture various rubber articles, including tires and tubes. Incorporators are Morris N. Nobil, David M. Siff, Charles F. Schwartz, George B. Nobil and Isador B. Nobil.

Grand Rapids Tire & Rubber Corp. announce the payment on April 1 of the regular 2 per cent quarterly dividend on preferred stock of the company.

Automotive Bearings & Equipment Co., Cleveland, has been chartered with a capital of \$25,000 to deal in equipment for motor vehicles and especially in bearings. Incorporators are George E. Sewell, George W. Veale, D. E. Morgan, John C. Barkley and L. S. Lomasson.

J. H. & F. A. Sells Co., Columbus, Ohio, manufacturers of saddlery has opened an automotive department to manufacture and deal in accessories. Harry D. Sims, formerly a Columbus man, has been placed in charge of the department.

American Bearings Co., Indianapolis, has bought the factory building recently owned by T. B. Laycock Son & Co., manufacturers of juvenile bicycles. The deal is said to have been pending for some time, and the bearings company has been installing machinery in the recently acquired plant for two weeks.

Michigan-Ohio Automotive Equipment Co., Cleveland, has been chartered with a capital of \$50,000 to manufacture and deal in various kinds of equipment and accessories. Incorporators are Harry G. Smith, David Cowan, Elbert W. Fields, Hyman Cowan and Alexander J. Marcus.

Ohio Metal Wheel Co., Waynesburg, Ohio, has been incorporated with a capital of \$50,000 to manufacture various kinds of metal wheels for automobiles. The incorporators are T. M. Vaughn, R. B. Wilkinson, Roy R. Finefrick, H. W. Dankert and A. L. Nims.

Gilson Mfg. Co., Port Washington, Wis., is issuing \$350,000 of 7 per cent first mortgage bonds secured by tangible assets of \$1,000,000, to retire current indebtedness and finance enlargement of its production of malleable and gray iron castings, gas engines, farm tools, garden tractors, etc. Harry W. Bolens is president and general manager.

M. B. M. Mfg. Co., of Milwaukee, incorporated for \$25,000 in Wisconsin to manufacture, buy, sell and deal in tractors, farm tools, power farming equipment, etc. The incorporators are John Buday, William J. Meyer and James A. Mould, Milwaukee.

B. J. Westcott, president of the Westcott Motor Car Co., and Alfred G. Hare, of Hare & Chase, Philadelphia, were elected new directors of the Kelly-Springfield Motor Truck Co., of Springfield, Ohio. James L. McCarthy, of Quebec, was elected vice-president of the company.

TO APPRAISE USED TRUCKS

St. Louis, April 15—A used truck committee to arrange the proper appraisal of trucks offered to dealers in part payment on new trucks was appointed at a meeting of the Commercial Car Bureau of the St. Louis Automobile Dealers Assn., held recently.

SENECA PRICE REDUCTION

Fostoria, O., April 18—The Seneca Motor Car Co. has reduced the price of its model M $\frac{1}{2}$ -ton truck from \$920 to \$820.

NEBRASKA AUTOMOBILE ASSN.

Omaha, Neb., April 15—For the purpose of protecting the welfare of the automobile owners of the state, the Nebraska Automobile Assn., Inc., has been organized with general offices in the Bankers' Life building, Lincoln, Neb.

WARD TRUCKS REDUCED

Mt. Vernon, April 18—The Ward Motor Vehicle Co. announces price reductions. The WS-2 model, $\frac{1}{2}$ ton capacity, is now \$2,485 and the WA-2 model, $\frac{3}{4}$ tons capacity is now \$3,295.

St. Louis Wants Western National Automobile Show

Manufacturer Urges Advantage of Missouri City Upon N. A. C. C.

ST. LOUIS, April 15—A campaign to move the Western National Automobile Show, held in Chicago the last week in January each year, to St. Louis, has been inaugurated by Webster Colburn, vice president and general manager of the Dorris Motor Car Co. Recently Colburn wrote to Alfred Reeves, manager of the National Automobile Chamber of Commerce, under whose auspices the show is held, and last week he followed it with another letter to each member of the N. A. C. C., urging the change to St. Louis.

Colburn expects to enlist in the movement the St. Louis Chamber of Commerce, of which F. W. A. Vesper, president of the Vesper-Buick Auto Co. is president, as well as the members of the St. Louis Automobile Dealers Assn.

Colburn's letter to Reeves direct attention to what he calls the "utter inadequacy" of the Coliseum and Armory in which the Chicago show has been held for years.

Colburn directs attention to the large Chevrolet building in St. Louis, used in the last two local automobile shows, which provided space on one floor for passenger cars, trucks and accessories.

Colburn urged that the matter be referred to Samuel A. Miles, manager of the national shows.

YELLOW CAB MAKERS BUSY

Chicago, April 17—The production of the Yellow Cab Mfg. Co., manufacturers of Yellow cabs, for April will be more than three times the production for April of last year. The output at this time last year was five or six cabs a day and now it is 15 to 20 a day. The shipments in March were 350 cabs. Several departments of the factory, including mill and machine shops, are working day and night.

More of the cabs are now going to New York than to any other city. Sales are 50 days ahead of production, orders now in hand being sufficient to keep the plant busy until well into June.

NEW OVERLAND TRUCK CHASSIS

Toledo, O., April 15—An Overland four chassis, redesigned for truck use, has been brought out by Willys-Overland, Inc., and will sell for \$450 f.o.b. Toledo.

The truck chassis differs from the passenger car chassis in that it has heavier axles, stronger rear springs and a round gasoline tank mounted directly above the dash. The tank has been placed in this position to permit use of standardized types of truck bodies designed by various manufacturers for 100-in. wheelbase chassis.

CONCERNING MEN YOU KNOW

Rudolph Hokanson, vice-president and general manager of the Nash Sales Co., Milwaukee, a large territorial distributor of the Nash line, has been appointed chairman of the transportation committee of the Milwaukee Association of Commerce by the new administration. This is considered one of the most important bodies in the organization, due to the big strides it has made in the development of motor truck lines, highway construction and similar aids to more efficient and economical haulage.

George W. Shannon, who had charge of the Iowa distribution of the Hupmobile, has joined the Millsap Motor Co., Cedar Rapids, as sales manager.

C. D. Breitzke, Madison, Wis., is planning to engage in quantity production of a new type of automobile license plate illuminating appliance for which he has applied for patents.

W. Scott Hagar, for many years branch manager of the Brooklyn branch of the Packard Motor Car Co., has joined the sales force of the Lewis-Abbot Motors, Inc., of Brooklyn, and will devote his entire time to the sales of Peerless eight-cylinder cars.

C. M. Crawford has resigned as president of the Filling Station Men's Association. F. D. Treadway, of the Indeceda Tire Co., has been elected to succeed him.

Paul R. Walker, after many years of sales work with the Firestone and Oldfield companies, has also joined the Victor Rubber Co. as a special representative. Walker's efforts will be along the lines of extensive sales work and assistance to the Victor field force.

W. P. Reed, Philadelphia manager for the Sewell Cushion Wheel Co., of Detroit, has moved his office.

Arthur Davidson, salesmanager of the Harley-Davidson Motor Co., Milwaukee, has been appointed chairman of the foreign trade division of the Milwaukee Association of Commerce for the new year. C. E. Searle, general sales manager of the Allis-Chalmers Mfg. Co., has been named vice-chairman. Plans of the committee embrace the creation of a new association bureau to develop the foreign trade of Milwaukee manufacturers, among whom are some of the best known national advertisers in the country.

J. A. Lee, formerly in charge of Packard service in Milwaukee, has joined the Loomis Motor Co. sales force in Cedar Rapids, Ia., handling Cadillac, Jordan and Dort cars.

John L. Mason, Davenport, Iowa's, oldest automobile dealer, died here at the age of 78 years.

David L. Gallup, who for five years has been at the head of the division of research and experiment of the Nordyke & Marmon Co., Indianapolis, has resigned, to take effect May 1.

Canton Motor Car Co., Canton, Ohio, has taken over the Franklin franchise for that territory from H. S. Belden. The latter will continue with the company as a member of the sales organization.

Joseph Davis, familiar figure on Chicago's row for years, where he managed the Winton company, has resigned. William Ruehl, salesman for the Winton, succeeds him.

W. F. Haberer, foreign trade department of Deere & Co., Moline, Ill., will be an Illinois Manufacturers' Association representative at the ninth National Foreign Trade convention in Philadelphia, May 10-12.

A. R. Kroh, of Chicago, addressed the Automobile Dealers' Association of Memphis at its regular meeting and luncheon at Hotel Gayoso this month. He discussed at length the problems of automobile merchandising, declaring that the dealer who does not keep his business on a high, honest and ethical basis is marked for elimination through the progress of the industry.

Harry W. Frister, known in northern California automobile circles and connected with the sales department of the Leach Motor Car Co., has been promoted to salesmanager in charge of the display room at San Francisco.

R. H. Harper, who formerly was head of the Harper-Overland Co., in Washington, has been appointed distributor of the Durant line for the District of Columbia, Virginia and parts of West Virginia, Maryland and Tennessee.

C. A. Cole, salesmanager of the F. C. Meyer Motor Co., distributors of the Garford trucks, has been elected chairman of the Commercial Car Bureau of the St. Louis Automobile Dealers' Association to succeed Charles E. Pagett, formerly manager of the St. Louis branch of the General Motors Truck Co., who resigned.

J. W. David, for the past five years connected with the Philadelphia branch of the General Motor Truck Corp., has been appointed manager of the St. Louis branch to succeed C. E. Pagett, who recently resigned to take the sales management of the De Luxe Automobile Co., Oldsmobile distributor.

R. W. Sutherland, former general manager of the Splittorf Electric Co., has been elected vice-president of the L. F. Benton Co., which manufactures screw machine products at Vergennes, Vt. Sutherland retired from the Splittorf company about six months ago after a service covering several years.

C. W. Matheson, who has been general sales manager of Dodge Brothers Motor Car Co. since 1920, has been promoted to vice-president in charge of sales. John A. Nichols, Jr., director of field operations, becomes general sales manager and John H. Gordon director of distribution.

L. H. Bennett, formerly known as the "business doctor" of the California Automobile Trade Association, has been appointed director of merchandising for all branches of the Chanslor & Lyons Co. Bennett was for many years a Ford dealer and has also been associated with the Studebaker and General Motor Corp.

J. W. Weeder is now associated with F. E. Wing, Marmora distributor in Boston, as manager of the renewed car department.

Automotive Electric Service Assn. Adds to Its Membership

Second Year of Organization Finds Association Strong and Growing

DETROIT, April 13—The Automotive Electric Service Assn., comprising companies representing national manufacturers of electric equipment for cars, reports the addition of about 20 members since its annual meeting at the Chicago show, and is continuing vigorously its campaign for enrollment of members.

Under its constitution the association has been unable to entertain the proposal of the National Automotive Electrical Assn. to take over the entire membership of this organization, but has notified it that it will accept for membership all companies representing manufacturers affiliated with the Automotive Electric Assn.

The Automotive Electric Service Assn. is now in the second year of its organization. D. W. Burke of the Auto Electric & Service Corp. at Detroit, is secretary. Sectional meetings of the association are planned when the membership has been increased to a satisfactory point. Bulletins are now under way which will keep members and prospective members in touch with its activities.

NEW COMPANY FOR INLAND

St. Louis, Mo., April 15—The Inland Products Co., a new corporation organized under the laws of Missouri and capitalized at \$500,000, has purchased the assets of the Stark-Inland Machine Works, manufacturers of the Inland One-Piece piston ring and other automotive products.

Clyde C. Miner has been elected president and general manager and brings to the new company 25 years manufacturing experience, having been connected for many years with one of the best known electrical manufacturers in this country. Under Miner's management, it is expected that the Inland Products Co. business will be greatly increased and other products added to their line.

The Inland Products Co. plans to erect a new and modern factory which will be ready for occupancy within 90 days and will have ample capacity to take care of the company's expected increase in production and sales.

BATTERY DEALERS ORGANIZE

St. Louis, April 15—A new St. Louis Storage Battery Trade Assn., to replace a similar association which has held no meetings for many months, was inaugurated at a meeting of storage battery dealers here. Harry J. Brockmann, of the Battery Exchange, Inc., Philadelphia Diamond Grid distributors, was chosen temporary chairman and Robert E. Lee temporary secretary.

Truck Sales Improving In South and Middlewest

Detroit, April 17—Business conditions throughout the middle and southwest are showing a decided change for the better and this is having a strong tendency to improve the motor truck business, Vance H. Day, salesmanager of the G M C Truck Co., said after an extensive trip through this territory. Cities visited included Chicago, St. Louis, New Orleans, Houston, Dallas, Salt Lake City, Lincoln, Denver and Kansas City.

Most of this business is coming from the industrial centers, he said, the farmer being responsible only for a small part of it. There are indications of strong business from the agricultural districts late in the summer, but this depends largely on the prices the farmer is able to command for his products.

Most of the business is for lighter

model trucks, Day said. Buying in the heavy duty vehicles is light. In April the G M C Truck Co. will manufacture 1000 vehicles and the May and June schedules are expected to be as heavy. The company is making extensive preparations for marketing its new bus which is now in production.

FRANKLIN UNFILLED ORDERS

Syracuse, N. Y., April 15—The number of unfilled orders for retail delivery on books of Franklin dealers was greater on April 5 than at any time during the past seven months, according to reports received from all parts of the country by Franklin Automobile Co. This condition, indicative of a heavy volume of spring business, is making itself felt at the Franklin factory in shortages in certain types. To meet these shortages the factory is advancing the production schedule in these types.

The READERS' CLEARING HOUSE

Questions & Answers on Dealers' Problems.

Method of Procedure in Collecting Bill by Public Sale

Q—About a year ago a car was put in storage with the understanding that it would be called for in about sixty days. No storage has been paid and the garage owner has sold out and he turned the car over to us for storage. We cannot find the owner and would like to know just what to do to get title to same so that it can be junked safely and so that we can give title to the motor, should we have chance to sell. Numerous letters have been sent to the owner but the letters have been returned uncalled for.—Kimball Motor Co., Grand Junction, Colo.

A—Section 4014 of the Revised Statutes of Colorado gives a garagekeeper and others a lien on any property stored with him by the owner or person lawfully in possession thereof, for such storage and keep and for all reasonable and proper advances made thereon by him.

Section 4016, of these Statutes provides that if the charges are not paid within 30 days after same becomes due and payable, the garagekeeper may apply to any justice of the peace of the county where he resides to appoint 3 appraisers to appraise the property.

Section 4018, same statutes, provides that after the appraisal the garagekeeper may proceed to sell the property after first giving 10 days' prior notice of the time and place of such sale, with a description of the property to be sold, by publication in some newspaper of his county and delivering to the owner of such personal property to be sold, or if he does not reside in the county, transmitting by mail to him at his usual place of abode, if known, a copy of such notice. The lienor may sell all of such property, or so much as may be necessary at public auction, at any public place within his county, between the hours of 10 A. M. and 4 P. M. of the day appointed, for cash in hand.

And from the proceeds of the sale he may pay the reasonable costs of such appraisal notice and sale, and his reasonable charges for which he has a lien. The residue of the proceeds and property unsold he shall render to the owner.

No sale may be made for less than two-thirds of the appraised value. Also, the lienor or garagekeeper who has the lien may become the purchaser.

The lienor shall cause a bill of sale to be filed with the justice of the peace before whom such appraisal was had, giving the sum paid and the purchaser at the sale.

The Readers' Clearing House

THIS department is conducted to assist dealers and service station executives in the solution of their problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of *MOTOR AGE* is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Addresses of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert and P. L. Dumas; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; General Business questions, by *MOTOR AGE* organization in conference.

LAWS AGAINST AUTOMOBILE RACES ON SUNDAY

Q—Is there a law in the state of Oklahoma against automobile races held on Sundays?

What states do not have a law against races on Sunday?—Fatz-Ray Willard, Ponca City, Okla.

The Oklahoma statute prohibits all shooting, sporting, horse racing, gaming and other public sports. Gaming includes all contests of strength, skill or chance between men or beasts upon the results of which a wager is laid. Public sports include everything where an admission is charged. Hence, we are of opinion that automobile racing on Sunday would be in violation of this law.

We do not have information as to the states which do not have a law against races on Sunday without consulting the laws of each of the 48 states.

COLLECTING BILL BY GARNISHEE-ING WAGES

Q—Will you advise if, in the state of Iowa, we can garnishee a single man's wages in order to get what he owes us for parts purchased for his car? His account amounts to \$30. He has disregarded all written requests and when approached personally said he did not know whether he could pay it. What steps are necessary to take to garnishee a man's wages?—A Reader.

One may tie up a single man's wages

in Iowa by garnishment proceedings. If one has no lien on the customer's car, and he has no other property, but is earning a suitable salary, garnishment is the most effective if not the only way or means whereby a collection may be held. By putting up a bond a suit may be started and garnishment made before a judgment obtained on the claim.

If one has knowledge that money is due his debtor and he fears that it may be paid to debtor before he can sue and get judgment on his claim, he may use this method of grabbing the money in the hands of the third party, by naming the third party as garnishee. Otherwise he may sue and get his judgment and then have garnishment of the garnishee, who is the employer, or other person having money belonging to the debtor.

CANADIAN OFFICIALS MAKE PRIOR CLAIM ON REPAIRED CAR

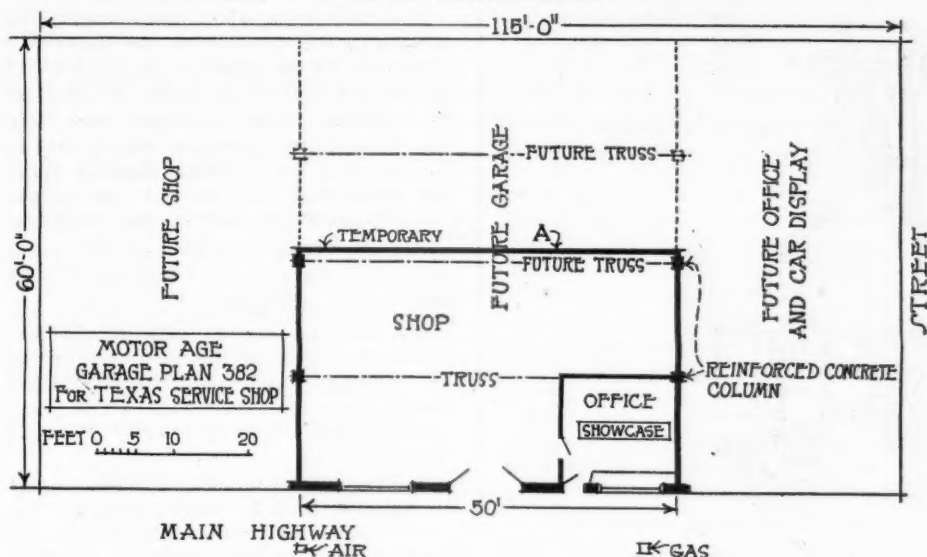
Q—A short while ago a party from the Canadian side brought a car in here for repairs, which is a common thing as we are close to the line. It appears this party had not reported to the Customs, of which we knew nothing. We started to repair the car and while this was under operation, the Custom Officer seized same and wanted to take it away, but we persuaded him to leave it. We understand that it is now advertised to be sold at auction in less than two weeks. Can we hold this car for our repair bill according to our state law, seeing that is a foreign car?—Frykman Bros., Souris, N. Dakota.

The federal government's claim would have prior rights over your claim for lien. Under the North Dakota statute you are required to file your claim for repairs, in order to make same a lien, in the office of the Register of Deeds of your county within 30 days after all materials are furnished or labor performed or altering an automobile or other personal property, providing you do not retain possession of the said repaired property. If you have retained possession of the property this filing of lien claim is not necessary.

Now, if this sale at public auction is by the government officials you should file your claim for the repairs and ask that you may participate in the remaining proceeds of the sale in the government's hands.

Your state statute attempts to make the repairman's lien a prior claim over mortgages, purchase price liens, judgments, etc. Whether this is constitutional or not your claim would not be prior to a government's claim for taxes, duties, etc.

Building to Accommodate Future Additions With Few Alterations



PLAN NO. 382

Q—Kindly give me suggestions for a garage and maintenance station to be erected in a small country town on main highway with a floor space of 1200 to 1600 square feet but to be enlarged later on when the occasion arises to about twice this size.

Gas, oil and accessories will also be handled. I think that a floor space of 200 to 250 sq. ft. will be large enough for the office and accessories. Expect to use reinforced concrete for walls and floor.

Please show location and sizes of windows, doors, etc. Would like to eliminate supporting posts inside of building if practical and if this doesn't increase the cost much.

It will probably be two years before it is necessary to enlarge this building, but as I am almost sure of doing this I want a building now that will be convenient and look as well as possible, and one that will not have to be remodeled with a waste of labor and material when the time comes to enlarge.

In connection with above described building I am considering moving on to the same lots for temporary use, until building is enlarged to its planned capacity. A wooden building, a plan of which is shown on attached sheet, also a drawing of the lots 60 x 115 ft, on which I expect to erect the concrete building. I am unable to draw a plan that looks good to me, or in which I think the wooden building can be used temporarily to advantage, but probably you can do so. If this is used the first section of new concrete building could be some smaller. Texas Service Shop.

Looking at your proposition from the standpoint of doing the work once and

for all without rearranging to suit the addition, it will be necessary to take several things into consideration.

First, the space at your disposal, considering 1600 sq. ft., would be 60 ft. by 32 ft. We make one dimension 50 ft. because that is the most usable for all purposes. If we place this at the rear we can use it for machine shop and general service and it will not be altered when the enlargement comes.

On the other hand if the building is placed in front we can have a much better appearing layout with a plate glass show window for accessories, etc., but it will surely come to pass with the enlargement of the building that more office and showroom space will be needed and rearrangement will be necessary. It is mostly a question of choosing which is the lesser of two evils.

We suggest in our layout, that you build the center section first, considering, of course, that eventually you intend to cover the whole lot. This will give you the corner for future extension of office and showroom and the rear of the lot for shop purposes while the present center part will make the garage or storage section, and can be extended back the full 60 ft.

Partition A would be the only one which is temporary. You might use the wooden building as a machine shop and parts stock room and place it along side or at the rear of the new building. It

is not large enough to hold cars or to be of use as a repair shop though it might serve for battery and tire repairs, provided you go in for these branches.

Do not use reinforced concrete for walls; hollow tile, brick or cement blocks are better and cheaper and much easier to alter.

ELECTRICAL SYSTEM FOR MERCER

Q—One of our customers has a Mercer 22-72 that is equipped with a U. S. L. starter and generator and as the equipment has never been very satisfactory it has caused considerable expense in upkeep, he is desirous of installing some other type of electrical equipment. Give us your opinion on this and name of electrical concern that can furnish a first-class system.—Garrett Motor Co., Warrenton, Va.

1—While it is possible to put on a different electrical system, we doubt if the owner of the car would care to stand the necessary expense, as it would cost about \$400.00. The present generator built in the fly-wheel would have to be removed and a new fly-wheel with a ring gear on it would have to be installed.

The generator would have to be driven from special sprockets put on the clutch coupling and the whole installation would have to be a hand made job which could only be handled by some very competent service station having adequate facilities for this sort of work. If this change is made we believe that any reliable starting motor having Bendix drive and a lock torque of from 14 to 17 pounds would be adequate for this purpose.

TUNGAR BULB ON 110 A. C.

Q—Give us information for hooking up a Tungar bulb directly across the 110 A. C. line for charging storage batteries.—W. Smith, Ignition Service & Battery Co., Cleveland, O.

1—While as a laboratory experiment the use of a Tungar bulb directly on 110 A. C. might be possible, it would hardly be a practical scheme for use in a service station. The Tungar bulb requires two things, one of which is a very low voltage connected to a part of the bulb, this voltage operating a filament which becomes incandescent and makes transmission of the charging current to the bulb possible.

This low voltage would not be available with the scheme suggested. The successful operation of the Tungar bulb also depends on having a voltage which is variable depending on the number of batteries which are to be put on charge, so for at least two reasons the scheme would not be feasible.

In a regular Tungar rectifier the transformer which is incorporated provides for both of these things, a low voltage being taken from the secondary side of the transformer for use in the filament while other portions of the secondary side are selected at will so as to give the proper charging rate to the battery and prevent sending too much current to the bulb which would rapidly destroy it.

Architectural Service

IN giving architectural advice, MOTOR AGE aims to assist its readers in their problems of planning, building and equipping, service stations, garages, dealers' establishments, shops, filling stations, and, in fact, any building necessary to automotive activity.

When making request for assistance, please see that we have all the data necessary to an intelligent handling of the job. Among other things, we need such information as follows:

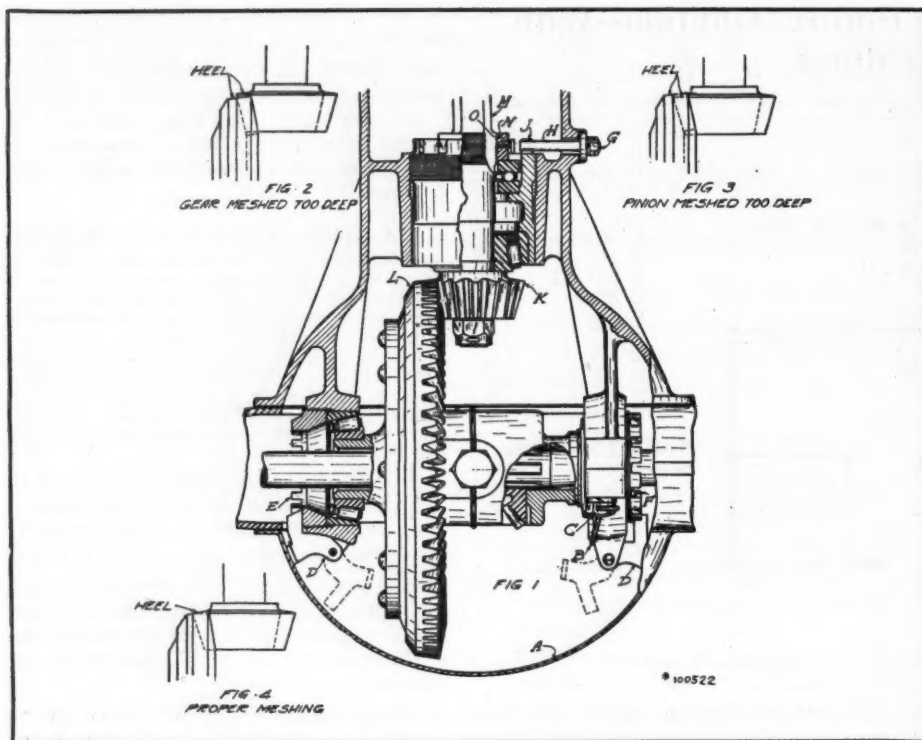
Rough pencil sketch showing size and shape of plot and its relation to streets and alleys. What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.



Showing the Method of Adjusting Saxon Rear Axle

Q—Would it be possible for me to obtain the adjustment diagram of the rear axle and engine of the Saxon four cylinder? I think it is the 1915 model. The cylinder bore is $2\frac{3}{4}$ -in. and has the oil pump on the side.

Is this a Timken rear axle and where can parts be obtained for the transmission, etc?—Arthur E. Sager, Manawa, Wis.

We regret to state that we do not possess any adjustment diagrams of the Saxon engine. Nevertheless any information pertaining to this engine may be secured from the Continental Motor Co., Muskegon or Detroit, Mich. A section of the Saxon rear axle is shown in Fig. 1. The Saxon model 14 and 15 axle housing, which was produced during the year 1916 was manufactured by the Detroit Steel Products Co.

However, the bearings in the rear axle were of the Timken tapered roller type. The adjustments for ring, gear and pinion on this model are shown above. To adjust these gears proceed as follows: Remove cover "A", if you find the gear and pinion meshed as in Fig. No. 2 proceed as follows:

Remove wires B and loosen cap screws C, swing locks D to dotted position, turn the adjusting nut E to the left and follow up by turning the adjusting nut F to the right, thus shifting ring gear to the left and leaving a clearance between gear and pinion. Remove cap screws G and lock H and turn adjusting nut J to the right moving the pinion into the clearance just made. This adjustment when properly made will bring the heels of the pinion and gear to the same plane as in Fig. No. 4.

If you find pinion and gear set as in Fig. No. 3, turn the adjusting nut J to the left, thus leaving a clearance be-

tween the pinion and ring gear. Now shift the ring gear to the right and take up this clearance by reversing the procedure given for shifting it to the left.

The heels of the two gears K and L should be in the same plane or flush at the heel. They should be adjusted with the least possible backlash and still not bind at any point around the ring gear. The amount of backlash clearance should be about .005 in. This can be determined by rocking the gear back and forth with the hand. Improperly set gears will result in noisy axles and broken teeth.

After the adjustment has been completed securely lock all adjustments and fill the housing with about two quarts of lubricant preferably a very heavy oil similar to the 600 W series. A humming noise indicates that the gears are set too close and a rattling noise indicates that the gears are not set close enough.

The final adjustment can be secured by moving the adjusting nut J which moves the pinion K in or out of mesh with the ring gear L.

To remove end play in main transmission shaft M remove shaft assembly from transmission case, open lock N and turn nut O to the right.

POSSIBLE TO USE WESTINGHOUSE RELAY

Q—Is it possible to use a Westinghouse relay (grounded case) style 273899-C in place of the Simms-Huff relay that is used on the 1917 Maxwell? If this is not possible would appreciate your advising some other method of regulation for this generator.—H. B. Bragg, Newark, O.

1—As the Simms-Huff on the 1917 Maxwell operates on 6 volts when generating and on 12 volts when operating as a starter, it will be possible to use

this type of Westinghouse regulator. When making the installation the case will have to be grounded.

The field wire which comes from the Simms-Huff generator to the number 3 field post on the junction box on the coil board will have to go to the "F" post of the regulator while the small wire from the Simms-Huff generator which goes to the junction box terminal marked dynamo number 2 will have to go to the "A" or armature post of the regulator.

The B or battery post of the regulator will have to be connected to one side of the ammeter.

To find the correct side of the ammeter the cover of the regulator should be removed and the cut-out points should be closed by hand so as to allow the generator to draw current from the battery.

If this current shows on the ammeter it indicates that the correct terminal has been used. After the installation has been made and the regulator adjusted the vibrating points should be watched carefully to see that the sparking is not excessive, and if it is, the condition can be improved by using a lower resistance in the back of the regulator.

If on the other hand there is very little sparking at the point but at high engine speed, the charging rate to the battery is too high, then a higher resistance in the regulator would correct the trouble.

CORRECTION ON RATE OF WESTINGHOUSE GENERATOR

Q—We sent you two questions several weeks ago which you answered for us but the one regarding regulating the charging rate of the Westinghouse generator on Chalmers Six 30, 1917 was wrong as the answer was for generator having third brush control, while this one has only two brushes.—S. L. Seeley, Plymouth, Iowa.

Seeley is correct as by mistake he was given directions for a third brush regulation type of generator. Output control on the Chalmers 6-30 Westinghouse equipment is by means of a regulating relay, which is mounted on the generator frame.

The relay closes at 700 to 750 revolutions per minute of the armature or approximately eight to ten m. p. h. and opens at 650 to 700 r. p. m. of the armature or at six to eight miles per hour. To adjust relay regulate the spring tension until the contacts close when the voltage of the generator reaches $6\frac{1}{2}$ to 7 volts, battery disconnected.

Then regulate the air gap between the armature and coil core until the relay opens with a discharge current from the battery of 1 to 3 amperes. Adjust the regulator to limit the voltage to $7\frac{1}{2}$ at 1000 r. p. m. with 8 amperes resistance load. Relay contact should be cleaned before adjusting.

LICENSE FOR REPAIR WORK

Q—Does a mechanic operating a maintenance station only have to pay \$25 to do repair work?—Illinois Reader.

A—No, you do not have to pay the \$25 to do repair work.

Compression and Its Effect on Carburetion

Q—Will a high compression engine carbon more quickly than a low compression engine?

2—In which of the following circumstances does the mixture of gasoline and air explode the quickest and most completely? (a)—When the engine is pulling hard with the throttle wide open; (b)—or with the engine pulling middling easy with the throttle half open; (c)—or with the engine idling with the throttle nearly closed considering the engine running at the same speed at each circumstance?

3—Why does an engine or the exhaust of an engine smoke so much out of proportion to the load? By this I mean why does the engine smoke more than twice as much on a hard pull as it does on a pull just one half as great? Why should this smoking of the exhaust be out of proportion?—Arthur Nelson, Cherokee, Ia.

1—Theoretically a high compression engine should not carbon any quicker than a low compression engine, in fact it should require decarbonizing less frequently. However the effects of carbon deposits in a high compression engine are more noticeable because an amount of carbon that ordinarily would not impair the performance of a low compression engine might produce preignition or knocking in a high compression engine.

2—Generally speaking, carburetion is best when the engine is under full load with the throttle wide open. The adjustment of the average carburetor is a compromise. The most efficient adjustment for one speed would be unusually inefficient for another certain speed. To secure acceleration and all around flexibility economy is slightly sacrificed. The wide open throttle permits of maximum volumetric efficiency.

3—The amount of smoke is not entirely governed by the amount of pull on the engine. The amount of fuel burned, the type of lubricating system, and the characteristics of the carburetor all have an influence on the amount of smoke present in the exhaust.

The general design of the engine is a determining factor. Considerable water vapor produced by the combustion of the fuel used passes off into the exhaust in the form of steam and is often confused with smoke from burnt lubricating oil. An observation such as you have made is not accurate unless the test has been conducted in a laboratory on the dynamometer.

INFORMATION CONCERNING AMERICAN UNDERSLUNG

Q—Give the following information concerning the engine used in the old "American Underslung" car. I do not know what model this particular engine is but do know that it takes a 1½ in. carburetor. Give the bore and stroke and revolutions and horsepower.

2—Where parts are obtainable (the nearest to Halifax).

3—Give type of oiling system.

4—The correct size of Zenith carburetor, also the jets and choke.

5—Can this engine be adapted to a motor-boat?—H. N. Silver, Halifax, N. S. Canada.

1—The American tourist engine is 4½x5 and takes an 1¼ S. A. E. carburetor which has an actual measurement of 1½ inches. We assume that this is the engine you refer to. The h. p. was approximately 45 at 1800 r. p. m.

2—This will be supplied by letter.

3—The oiling system on this engine is known as a non-splash system. It is not quite a pressure system although the effect is the same. The oil is carried in the sump of the engine and elevated from there by a gear pump to a sight feed on the dash. From this sight feed it feeds by gravity to the cylinders and to each main bearing. The oil that is fed to the cylinders lubricates the pistons until they reach the top of their stroke, when it is allowed to fall upon the connecting rods which are drilled to receive the oil.

After passing over the crank bearings, the oil is thrown off by centrifugal force in a spray which lubricates the camshaft, wrist pins, etc., finally draining through screen into the oil reservoir. The novel feature is a drain control located at the side of the crankcase which enables the operator to drain any excess above the maximum level or the entire oiling system by the manipulation of the lever. A dash adjustment is provided for the oil feed.

4—This engine requires a Zenith S. A. E. 1¼ in. carburetor. The jet equipment is not listed in the equipment list published by this company and the local service station recommends that you communicate with the factory direct, giving the exact bore and stroke of this engine.

5—This engine could be installed in a motor-boat, however, you can count on securing about half of the rated power of the engine when installed in this manner.

GROUND IN IGNITION SYSTEM CAUSE OF TROUBLE

Q—Advise what might cause trouble we have had with a Reo Speed Wagon 1918 model. We put on new ignition wires and started engine but after running ten minutes it stopped and in trying to locate the trouble we discovered smoke coming from the coil and also found the interrupter points were burnt. We took the distributor off cleaned it up and put in new contacts but could still get no spark from the coil. We then installed a new coil and the engine ran alright, but there is still some peculiar trouble in the interrupter for when the ignition switch is turned off we can get a spark from the interrupter terminal to the interrupter case. What is the cause of this trouble we have encountered?—W. M. Welch, Surprise, Nebraska.

1—Inasmuch as a two wire system was used on the 1918 Reo, it should be impossible to get a spark from either interrupter terminal to the interrupter case or housing, and as you do get a spark, it indicates an accidental ground in the wiring. To locate exact position of this trouble we would suggest that you remove both cables from the storage battery and then take another piece of wire and connect one of the storage battery terminals to the frame of the car.

A 6-volt test light can now be used with one wire from it connected to the terminal of the storage battery that is

not grounded, the other wire from the light being used to explore with in searching for the grounded part of the wiring. It is quite likely that you will find ground at many terminals, due to the fact that the wiring is all connected together and it will therefore, be necessary to disconnect the circuits from each other at different places until you have found the exact wire in which the trouble is located.

In a two wire system one accidental ground does not cause any trouble but two accidental grounds usually cause a short circuit somewhere. For example, if both of the wires leading to the ignition coil should get grounded it would cause a very heavy flow of current to go to the interrupter points which might cause the smoke which you observed at the interrupter.

About the only thing in an ignition coil which ever burns out quickly and in such a way as to cause smoke, is the ballast coil mounted on top of the ignition coil, although we believe that in most cases where this coil burns open, there would not be any smoke to indicate any such trouble. We believe it would be advisable to check the wiring as suggested to eliminate grounds which might cause future trouble.

NO CONCEALED WEAPONS IN CAR

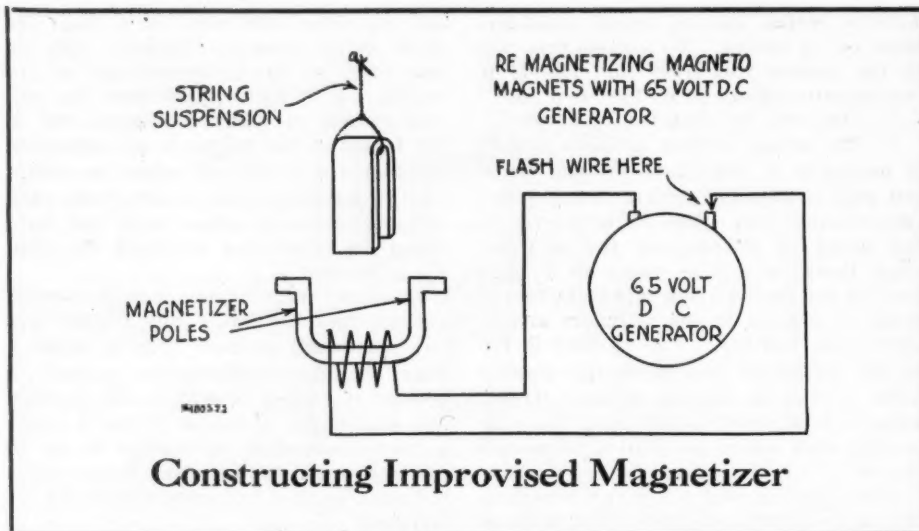
Is it permissible in the U. S. A. to carry a revolver in the car for personal protection while touring, provided it is not carried on the person? Is there a national license granting such permission?—Ross Moorhead, Findlay, Ohio.

I know of no federal law giving a tourist permission by license to carry in his car a revolver or gun.

Each state has its own law regulating the carrying of a pistol or revolver and some make exceptions in favor of those going on a journey. And one is held to be on a journey when he takes a trip outside the ordinary routine of his business, to a point far enough distant from his home to carry him beyond the circle of his neighbors.

Again some of the states have statutes which the courts construe to require that the weapon be carried on the person or attached to the person in some manner, as carried in a satchel or handbag, to come within the law. One decision has held that carrying a revolver under the seat of a vehicle within easy reach was within the enactment against carrying concealed weapons. By inference if the gun were carried in a car within the reach or ready access of the person he would not be guilty under the act.

It will be seen the law is conflicting; but that the general intent is to keep citizens disarmed, and in particular to take away the means of offensive attack. Carrying a weapon as suggested at least would be open to attack in all the states and if officials should care to prosecute, they would cause one endless trouble though no conviction might be had. Now, of course, as a matter of fact, few officials would be searching one's car for concealed weapons.



Q—We have four magnetos which have weak magnets and as there is no place nearby where we can get them magnetized we would like information which will enable us to do the work. We have a 65-volt d.c. generator which we can use as a source of current. We have a low tension Splitdorf, a high tension Bosch magneto and two Webster oscillating magnetos all of which require remagnetizing, and we would like to know how to do this with the 65-volt generator.—W. M. Wigner, Alberta, Can.

We do not know exactly what other material you have at your disposal but hope you will be able to get some fairly fine insulated copper wire and that you have a piece of iron that you can make into a magnetizer. The general plan of doing this is shown above. The piece of iron for the frame of the magnetizer should be shaped approximately as shown, the distance between the poles being such that any of the magnets that you have to be remagnetized will be able to set on the magnetizer with one side of the horseshoe on one pole and one side on the other pole.

The size of the piece of iron used should be such that its cross sectional area is as much as that of the magnets or greater if possible. For example, a piece of $\frac{1}{2}$ by $1\frac{1}{2}$ in. iron would probably be all right or if an old wagon tire is available two or three layers of it could be shaped together to give the necessary cross section.

The wire that should be used should be about 1-64 in. in diameter or smaller but wire up to 1-16 in. diameter can possibly be used in an emergency. The only result being that a pretty bad flash will be obtained when the connection from the magnetizer is made and broken at the generator.

The amount of wire will probably be from four to five pounds but this can vary depending on what is available. The process of magnetizing is fairly simple after you have the magnetizer built up. Above, the magnet which is to be strengthened is shown suspended on a piece of string above the magnetizer and in a crosswise position from the location of the magnetizer.

This is for the purpose of allowing the magnet to go on the magnetizer in the

right direction so that it will be strengthened instead of weakened. A magnet always goes on the right way if allowed to turn as a result of the magnetic pull. After the magnet has been suspended as shown the generator should be started and the wire flashed on the terminal. This will cause the magnet to suddenly jump sideways and it should be allowed

Excessive Output a Probable Cause of Chronic Generator Trouble

Q—A generator using third brush method of regulation on a popular make of car failed to show charge. Upon investigation it was found that the solder had been thrown out of the commutator bars and that the wires were loose. The wires were all soldered back into the commutator segments and the generator worked all right for about six weeks, after which time the same trouble was encountered.

We believe the armature is either opened or short circuited but have no instruments for testing it. If the brush springs were too strong would the friction of the brushes on the commutator be sufficient to cause this trouble if the car was driven at high rate of speed for 10 miles?—A Constant Reader.

1—It is not likely that brush friction would cause the trouble described unless starting motor type spring had been installed by mistake instead of generator brush springs. On a third brush machine it is most likely that the brush has been so located as to give too high an output. For example, if the generator is designed to give 10 amperes without serious heating and the position of the third brush is such that it produces 20 amperes then the heating of the armature will not be doubled the allowable amount but will be four times for the internal heating due to resistance lost in the armature conductor goes up as the square of the current.

Another condition which will cause a generator to throw out solder due to overheating is poor connection or open circuit between the generator and battery. If magneto equipped such a condition would not be noticed in the running of the engine but on a battery ignition system an open circuit between generator and battery would not only over-

heat the generator but would tend to burn up the ignition coil and interrupter if the trouble occurred while the car was running, but if the opened circuit occurred while the car was standing it would probably prevent the ignition working and the engine could not be started.

After the correct position of the magnet has been determined the wire can be flashed on the generator terminal eight or ten times which should give considerable strength to the magnet. This wire could be permanently connected to the generator if the magnetizer were scientifically designed but the design you will have will probably draw too much current from the generator and cause overheating if the connection is left for any length of time.

If possible the magnet when transferred from the magnetizer to the magneto should have a flat bar of iron about $\frac{1}{4}$ by $1\frac{1}{4}$ in. cross section and this piece of iron should be used as a keeper and applied to the magnet before it is removed from the magnetizer and removed as the magnet is slid onto the magneto. The use of the keeper in this fashion will retain the magnetism to the greatest possible strength. It might also be added that in addition to using insulated wire it would be well to wrap strips of paper around the iron core or else strips of tape to make sure that the wire does not become grounded, that is, make contact with the core.

It does not take a very elaborate instrument to get a check on the armature. For example, if you have either a dry cell or a storage battery you can use the dry cell or one cell from the storage battery and connect an ammeter in series with it so that you have two fair test leads which when touched to each other will allow the dry cell to send about 20 amperes through the ammeter. If these two test points are now touched on adjacent commutator bars you will get a discharge reading of about 10 amperes from bar to bar if the armature is all right. This will, of course, vary somewhat with different types of armatures. Assuming that the reading is 10 amperes from bar to bar for three or four tests then suddenly you would get a reading of 18 amperes this would show a shorted condition between the bars being tested or in the coil attached to those bars. If on the other hand the reading should drop down to one or two amperes it would show an open circuit. To test a commutator for grounds you can use 110 volt circuit with a lamp in series with one of the leads so that touching your test points together will light the lamp. The test points can then be connected one to the shaft of the armature and the other to the commutator and the lamp will light up if the armature is grounded.

Details and Adjustment of Ensign Carbureter

Q—Show details or cutaway view of Ensign type JG carburetor as used on model G International trucks. Show fuel level and float chamber, also give instructions for adjusting carburetor.

2—Can starting and lighting battery be used in place of dry cells as used with Bosch double ignition system on 1912 Stoddard-Dayton four-cylinder engine? If so, publish standard diagram showing connections.

3—Show details or exploded view of vibration damper and explain function of same on Studebaker Special Six, 1921 model. Also show power curve of engine used in this car.—H. M. Jameson, Mount Pleasant, Tenn.

1—A detailed view of the JG Ensign carburetor is shown in Fig. 1. This model Ensign is for gasoline only. The model JD is also used on this make of truck in the territory west of the Rocky mountains where distillate is the common fuel. The following description applies to both:

The fuel enters and passes upward through screen B, and downward through the float-controlled needle valve, into the float chamber. The float maintains the fuel level 1-32-in. below the top of suction tube, which opens through holes "A" at its lower end into the centrifugal

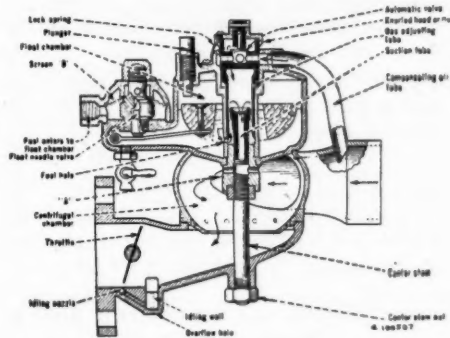


Fig. 1—Sectional view of the model
I G Ensign carburetor

chamber. Suction tube is surrounded by a larger tube into which fuel enters through small fuel hole.

The effective opening of this hole is controlled by gas-adjusting tube shown in solid black, which can be screwed up and down by its knurled head. This tube performs the function of the usual gas-adjusting needle valve.

A compensating air tube is connected to the interior of the gas-adjusting tube through the automatic valve which lifts when the air speed through the carburetor becomes high enough, and lowers the vacuum in the gas-adjusting tube, preventing the formation of too rich a mixture.

There is but one running adjustment, that of gas adjusting tube. When this is open $1\frac{1}{2}$ turns the fuel hole is entirely open. Start the engine with this adjustment retard the spark and open the throttle, then screw down the knurled head until the best speed is obtained. See that lock spring bears firmly against the knurled head to hold the adjustment.

Should special conditions require ad-

justment of suction tube remove gas adjusting tube and use a screw driver to adjust suction tube, taking care not to nick sharp rim of tube.

Be careful not to injure seat of strainer housing.

If carburetor is ever taken apart see that the screws containing holes, "A" are set up tightly to make tight joint between the larger tube and float bowl

Do not tighten center stem nut excessively as it has nothing to do with stopping leaks.

2—We assume that you refer to the dual system. The wiring diagram of the four-cylinder Dual Bosch Magneto has been printed from time to time in the columns of this magazine, nevertheless we are sending to you by mail a copy of this wiring.

3—View of the Studebaker starter clutch and vibration damper is shown in Fig. 2. The function of the vibration damper is to eliminate torsional vibration. It consists of a small flywheel placed at the forward end of the engine, supported by the crankshaft. One side of it is usually keyed or screwed to the crankshaft while the other is movable but is held by means of friction discs which are pressed together by springs. Like any flywheel the damper has considerable inertia and any sudden vibration in the motion of the forward end of the crankshaft will cause the vibration damper to slip. This slippage absorbs energy. Because of the elastic properties of steel any energy imparted to it will set up a vibration which will keep vibrating for a considerable time.

A frictional dampening device will absorb the energy stored in the crankshaft by fluctuations in the torque and thereby minimize the torsional vibration. We are informed by the Studebaker company that they do not send out blueprints of the power curve of any of their engines. In the Studebaker the vibration damper also acts as an overrunning clutch for the starter drive, and the rollers shown in the illustration are the methods of driving the crankshaft through a chain from the starter. The vibration damper springs are shown near the periphery of the vibration damper.

COMPOUND FOR FITTING BEARINGS

Q—We have heard that there is a grinding compound on the market that can be used for fitting bearings and that it has no appreciable effect on the shaft and yet cuts away the babbitt so as to make a good surface. We have also heard that in a few minutes it loses its abrasive effect so that it does not continue to produce a wearing action. Advise if this is so and where this com-

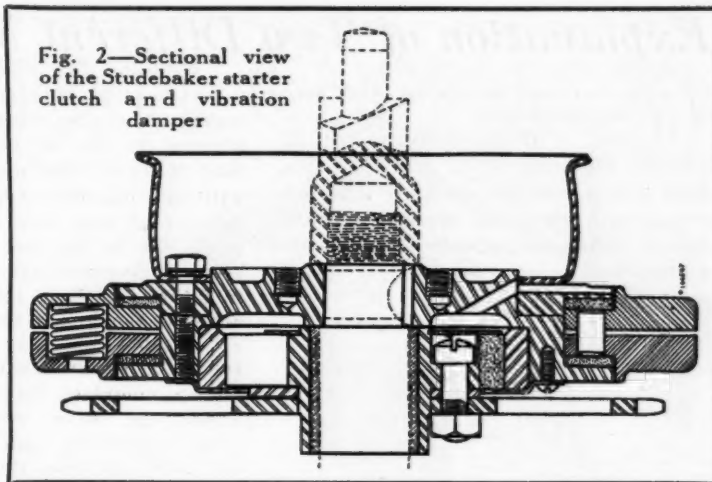


Fig. 2—Sectional view of the Studebaker starter clutch and vibration damper

pound can be obtained.—Henry Van Wienen, Thayer, Ind.

1—We know of two compounds of this nature, one for fitting bearings and one for lapping in pistons in cylinders. The material used for the bearings operates exactly as stated in the question, the effect on the shaft being very slight. Further information will be given by letter.

MOON MODEL 6-30 SPECIFICATIONS

Q—Did a Moon Six have Timken front and full floating rear axles, and has the front axle roller or ball wheel bearings?

2—What was the price and weight of this car?

3—What is the bore and stroke and how many main bearings did the engine have?

4—What is the rear axle gear ratio?

5—What is the h. p. and speed of this car?

6—Publish power curve if possible.—
Fred Cork, Des Moines, Iowa.

1—The Moon model 6-30 was equipped with Salisbury axles. The bearings in the front and rear axles and in the transmission were ball bearing.

2—The price of this car was \$1195 and the weight approximately 2650 pounds.

3—The bore was $3\frac{1}{4}$ in. and the stroke $4\frac{1}{2}$ in. and the crankshaft was carried on three plain main bearings.

4—The rear axle gear ratio is 4.60 to 1.

5—The N. A. C. C. h. p. of this engine was .25 and .35 and the speed between 55 and 60 m. p. h. The actual h. p. is not known.

6—This is not available. However, this engine was equipped with a 7W Continental engine.

MAXIMUM SPEED OF HAYNES AND MITCHELL

Q—Advise maximum developed by the Haynes Model 36 type T engine. Also the best speed obtainable by this car.

2—What is the maximum speed of the 1920 Mitchell Big Six, and what is the horsepower rating?—F. J. Brandt, West Salem, Ill.

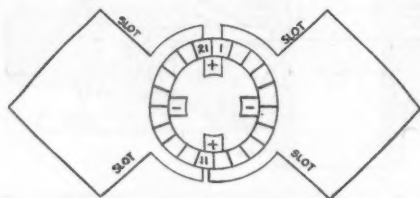
1—The Haynes model 36 type T develops a maximum of approximately 57 h. p. and is capable of making about 60 m. p. h.

2—The 1920 Mitchell Big Six is capable of making from 60 to 70 m. p. h. The S. A. E. horsepower rating is 25.35.

Explanation of Two Different Methods of Armature Winding

Q—Do four pole generators have wave wound armatures?

1—In Fig. 1 there is illustrated the winding required for a four pole machine and it will be observed that four brushes are used, the brushes of same polarity being on opposite sides of the commutator.



4 POLE ARMATURE WAVE WOUND-4 BRUSHES USED

Fig. 1

In tracing the winding from bar No. 1, we would follow the wire out through one slot and back through another slot to bar 11, then out through a third slot and back to a fourth slot to bar 21. In tracing in this manner from bar to bar, it will be noted that we have added ten bars each time, that is, bar No. 1 to 11, also from 11 to 21, and in returning to the same side of the commutator the winding has dropped back one bar.

2—Does a four pole generator require four brushes or can it get along with two only?

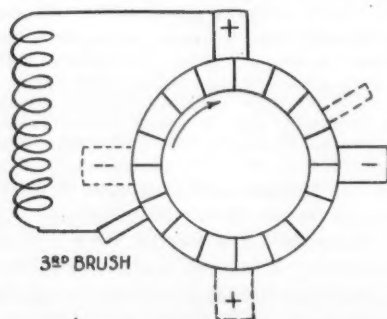
2—While it is possible to use four brushes in a four pole machine, the fact that opposite sides of the commutator are practically shorted together by the winding as shown in Fig. 1, makes it unnecessary to do so, one pair of brushes being sufficient, assuming, of course, that they are big enough to carry the current output of the armature.

For this reason in Fig. 2 which shows third brush location on a four pole generator, two main brushes only are used while the position the other main brushes would have is shown by dotted lines.

3—If only two brushes were used in a four pole generator would some kind of regulating resistance be necessary?

4—Can third brush regulation be used on either a lap wound armature or on a wave wound armature?

3 & 4—No regulating resistance is required due to the use of either lap or wave winding and third brush regulation can be used as well on one type as the other. See Fig. 2 and Fig. 4.



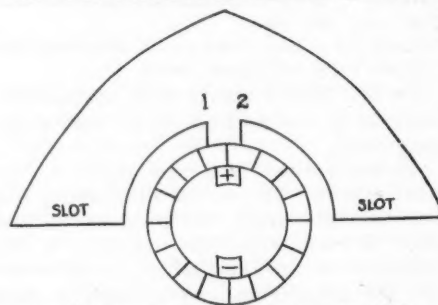
3RD BRUSH LOCATION-4 POLE GENERATOR

Fig. 2

On the four pole generator, however, regulation of the current output is more affected by the fit of the third brush, that is, as to whether it makes contact with the commutator over the whole surface or at one edge or the other, this being due to the fact that the distance around the commutator from plus brush to minus brush is less on a four pole machine than on a two pole machine.

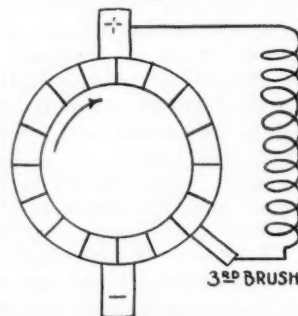
5—Publish diagram showing both lap and wave wound armatures.

5—A complete diagram of either lap wound or wave wound armature is rather confusing and difficult to trace out. The sketches shown in Figs. 1 and



2 POLE ARMATURE LAP WOUND-2 BRUSHES USED

Fig. 3



3RD BRUSH LOCATION-2 POLE GENERATOR

Fig. 4

3 will give the general idea and are not so confusing as a complete diagram. In the four pole sketch the winding would go from bar one to 11, then to 21.

From 21 it would go to ten and then to 20, and so on until the winding again came back to bar number 1. Here it will be observed that the winding drops back one bar every time it gets around the commutator.

In the two pole armature, lap wound, the winding goes from bar one to two, then from bar two to three, from three to four, etc., until the winding would get back to number one bar again.

6—Does a wave wound armature have an odd number of commutator bars?

6—The wave wound armature has odd number of commutator bars so that the same advance, which we have assumed is 10 bars each time, can be used without bringing the winding back to the same place from which it started, until all slots are filled.

7—Give information on installing new pistons in all kinds of cars, so as to give power and economy rather than speed.

7—The installation of new pistons is beneficial in case the old pistons and

rings have been causing trouble due to leakage of compression and due to allowing oil to work up into the combustion chamber to such an extent that the spark plugs foul up rapidly and carbon has to be cleaned out frequently. A separate letter will also be sent you on this subject.

8—When pistons are installed is it not customary to give them more clearance at the top than at the bottom? It is our opinion that the bore of the cylinder should be the same diameter all the way, and that any variation in clearance should be made in the piston itself. Is this correct?

8—Your assumption is correct that the cylinder bore should be the same diameter at all points and that any variation in clearance desired should be in the piston itself. The proper clearance for cast iron pistons is from .002 to .003 in. clearance for each inch of diameter at top of piston so that with a four in. diameter piston the clearance would be from .008 to .012.

At the bottom of the piston from .0005 to .001 in. to each inch of diameter up to 4 in., so that for a 4 in. piston the clearance would be from .002 to .004 inches. In fitting piston rings to the cylinder a clearance of .002 to .003 per inch of bore should be allowed at the bevel cut in the ring to take care of expansion. The lower ring can have about half this much clearance as the heating effect is less on this ring.

9—Would it be alright to lighten up the connecting rods also?—E. H. Plummer, Webster, Wis.

9—For power and economy only we would not recommend general practice of lightening the connecting rods.

CONVERTING SIX CYLINDER BOSCH MAGNETO TO 12

Q—Advise whether a four or six cylinder Bosch magneto can be converted into a 12 cylinder and how?—Max Souduck, Wausau, Wis.

1—It is possible to convert a four or six cylinder Bosch magneto into a 12 cylinder but it would be impracticable. The Bosch magneto delivers two sparks per revolution and if the magneto were to be installed on a 12 cylinder engine it would be necessary to run the magneto at three times the crankshaft speed.

This would mean on a high speed engine about anywhere from 8000 to 10,000 r. p. m. It would be impossible for the armature as constructed to stand this high number of revolutions due to the centrifugal force exerted on the windings which would have a tendency to tear themselves loose from the armature.

USING D. C. LIGHTING PLANT ON GROWLER

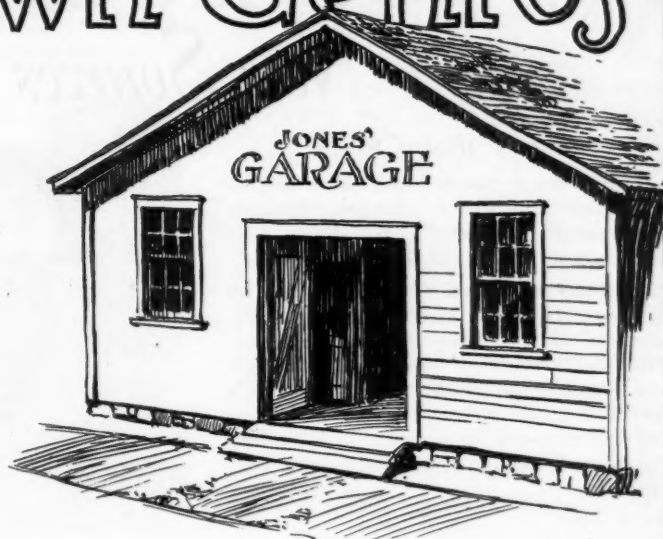
Q—We have 110 volt D. C. lighting plant and wish to use this direct current on a growler to test armatures. Please advise if this is possible.—Reader, Olustee, Okla.

1—Direct current is not suitable for use with a growler as change in magnetism is required which can only be obtained from the use of alternating current.

The Unknown Genius

*THE family and neighbors may know that you are
A wonder with tools around any old car;
That you run a shop with equipment complete
Its location is good; in fact, can't be beat.*

*BUT "how come" you have no profits to show,
Which you surely would have if motorists know
The kind of a place and the work that you do,
Just think for a minute—it's right up to you.*



*WHY keep it a secret—your shop's up to date,
When good jobs are waiting all over the state;
Crankshafts and cylinders which ought to be ground,
Why, man! It's a crime you are standing around.*

*USE your town papers—put in a good ad,
Wake up—shake a leg—your silence is sad,
A dust covered shop brings only compassion,
Hoping and waiting will never bring cash in.*

C. F. B.



Universal Catalog of A. E. A. Ready

THE Universal catalog of the Automotive Equipment Association has come from the press. The book, 12 in. high, nine in. wide and two in. thick, containing the announcement of manufacturer members of the association, is now on its way to the offices of jobber members, where it is intended to serve as a guide to buyers.

The book contains descriptions, illustrations and price quotations on products of a large number of manufacturer members of the association. In preparing it the thought uppermost in the minds of the compilers has been convenience to the buyer.

It is divided into seven classifications, as follows:

- Body equipment.
- Chassis equipment.
- Garage equipment.
- Electric equipment.
- Sundries.
- Tire Supplies.
- Tools.

Each of these major classifications is thumb indexed so that the buyer, with-

out hunting for page numbers, may turn to the class of equipment in which he is interested at the moment. There he will find the products of manufacturers in this class following one another in alphabetical order.

Financed by Manufacturers Having Space In It

The catalog is further classified by publication at the back of the book of a manufacturers' index and a products' index, the former printed on blue paper and the latter on yellow while the balance of the book is in white. The Manufacturers' index contains the names of manufacturers presenting products in the catalog, listed alphabetically with the page numbers where their products appear. In the products' index articles of equipment shown in the book are listed alphabetically with the page numbers where they may be found.

At the end of each division there are several pages left blank as memorandum pages for the jobber buyer using the catalog in his work.

The catalog, authorized at the November meeting of the association, was com-

piled by a committee headed by William Von Elm, of the A. E. A. laboratories. It was financed by the manufacturers having space in it. Copies will be furnished only to members of the Automotive Equipment Assn., the idea behind the publication of the catalog being that it would offer an additional means of co-operation in business-building between the two classes of members of the association and between individual members in each class.

In addition to serving as a buyers' guide the catalog is intended to place at the command of jobbing members of the association descriptive material regarding the products shown, properly illustrated for catalog purposes. The catalog committee will serve as a clearing house for jobbers desiring pages of the catalog for reproduction in their own catalogs which are used in selling to the retail trade. Reprints of entire pages, or illustrations from pages in the Universal catalog will be furnished to jobbers at the proper authorization by manufacturers concerned.

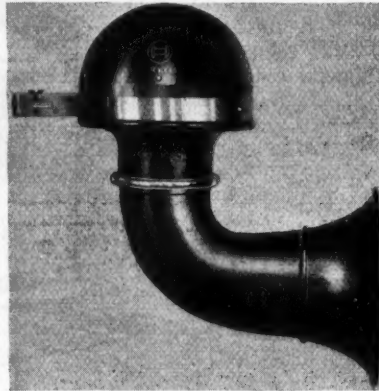
The Automotive Equipment Assn. has copyrighted the catalog.

The ACCESSORY SHOW CASE

New Sources of Retail Profit

ROBERT BOSCH HORN

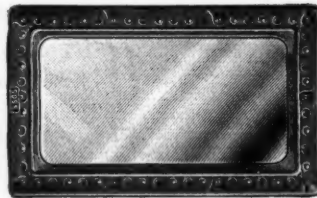
This horn is made both for 6 and 12 volts and in order to dampen the tone for special purposes a resistance may be obtained which can be connected between the horn and the source of the current. In order not to have the vibrations of the motor vehicle interfere with the vibrations of the diaphragms and thereby the tone of the horn, a spring body is injected between the horn and the support on which it is mounted. The horn is priced at \$30. Robert Bosch Magneto Corp., 123 W. 64th St., New York City.



Robert Bosch horn

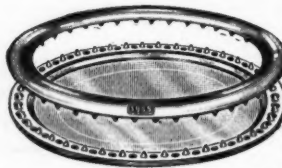
D-REX-U

The D-Rex-U is built of steel and finished in baked enamel. Price \$12.50, complete. Comstock-Bolton Co., 1925 E. 15th St., Kansas City, Mo.



DOUBL-HEAD SPARK PLUG

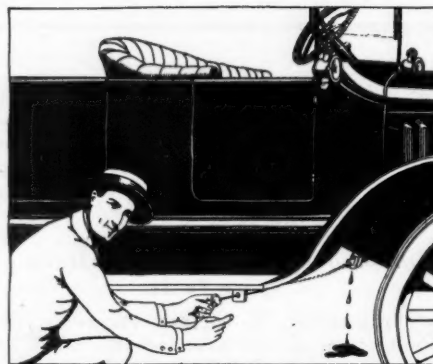
Doubl-Head spark plugs are made in all sizes, to fit all automobiles, trucks, tractors and stationary engines. Price, \$1.50 Reardon Co., Inc., Peoria, Ill.



Soss Grip-Tite curtain lights

HARDIN BRAKES

The brake lining used in the Hardin brakes for Fords is Thermoid. Hardin Brake Co., Portland, Ore.



Ackswell valve for Fords

ACKSWELL VALVE FOR FORDS

The Ackswell valve combines an oil indicator and valve which makes the job of removing oil easy. Price, \$1.25.—Huskee Tool Mfg. Co., 586 Public St., Providence, R. I.

SOSS GRIP-TITE CURTAIN LIGHTS

Die cast aluminum alloy frames with cone and socket fastening to hold fabric.—Soss Mfg. Co., Brooklyn, N. Y.



Carbon cleaner brush



D-Rex-U



Doubl-Head spark plug

HYSSOP

Hyssop motorist's kit is made of black calf skin or cow hide, with a comb, a mirror, a shoe cloth, a packet of special Scott-tissue towels and a can of Hyssop, the waterless soap. The whole outfit weighs only 1½ lbs. It sells for \$3.50, complete, with replenishing outfits of soap and towels at 50 cents. Mid-Western Soap Products Co., Milwaukee.

LACO PISTON RING

Originally developed for use in a locomotive throttle valve, where one ring is required to seal 200 pounds standing pressure of dry steam without oil, the "Laco" piston ring has been perfected to meet the requirements of motor cars.—Locomotive Appliance Co., Toledo, O.

APCOLITE SIGNAL

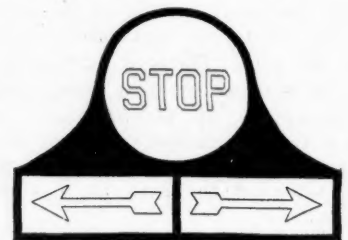
The Apcolite signal is made of cold rolled steel, with spot welded joints. There are no parts to work loose from the motion of the car. Price \$12.50. Arrow Products Co., 248 Congress st., Boston, Mass.

CARBON CLEANER BRUSH

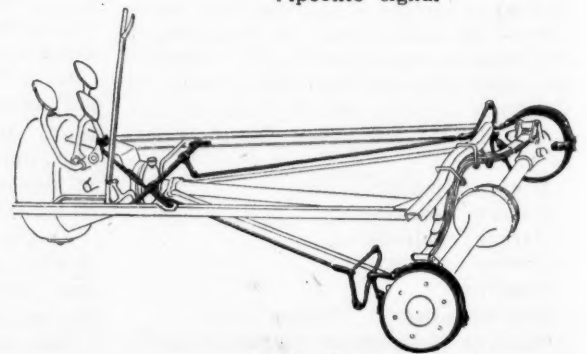
The carbon cleaner brush is made of highly tempered steel by Worcester Brush & Scraper Co., Worcester, Mass.

AUTO GLASS MIRRORS

The Auto glass mirrors come in all shapes and sizes, for fenders and windshields.—Auto Glass & Mirror Co., Buffalo, N. Y.



Apcolite signal



Hardin brakes

WEBSTER MAGNET LIGHT

A feature of this light is its ability to cling to the smallest steel or iron surface, such as a screw head, for instance. The electric magnet base exerts a grip that requires an eight-pound pull to break and being only 1 3/8 in. in diameter can be stuck into almost any tight corner about the car.

The light is fitted with standard design, double or single contact plug of six or twelve volt capacity and can be plugged in on any of the light sockets about the car. The four candle power bulb is protected by a nickel-plated guard which also shades the eye and concentrates the light where needed. Every light is provided with 12 feet of cord so that it can be moved to any part of the car. Webster Electric Co., Racine, Wis.

PETRIC TWINLOCK TIRE CARRIER

Petric Twinlock tire carrier, shown here, is made especially for all models of Ford cars, others are furnished for other cars. Prices, \$10 and \$11. N. A. Petry Co., Inc., Philadelphia, Pa.

COHAGRAN CORK SEALED PISTON RING

The feature of this piston ring is the cork seal. It is made by the Cohagran Patent Piston Ring Mfg. Co., 155 S. Broadway, Denver, Colo.

SPAD TIMER

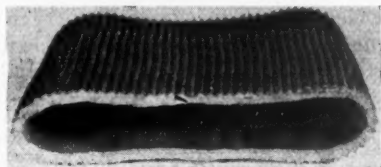
The Spad Mfg. Co., Inc., 42-A W. Thirty-ninth st., New York City, has succeeded the Omar Tire and Rubber Co. manufacturing the Spad timers. This timer was priced at \$4 during 1921 and is this year priced at \$2.50.

SIGHT FEED OILER FOR FORDS

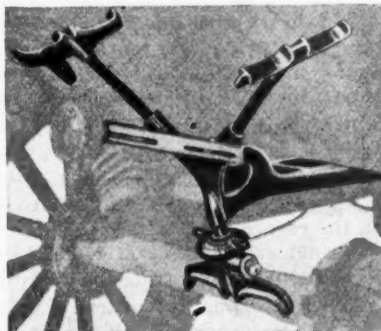
The price of the Sight Feed Oiler for Ford cars is \$7.50. Penn Motor-Crafts Corp., York, Pa.

LOCK ROLL ADJUSTABLE HOSE CLAMP

Lock roll adjustable hose clamp.—Federal Tin Co., Inc., Baltimore.



Corrugated inner tube



Petric twinlock tire carrier

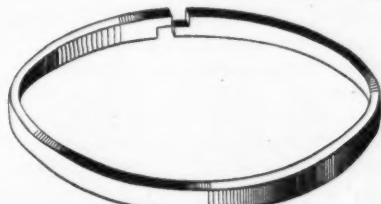


Cohagran cork sealed piston ring

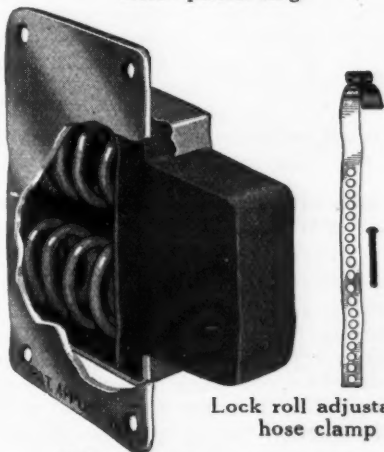


Teltailite

Webster magnet light



Zelco piston ring

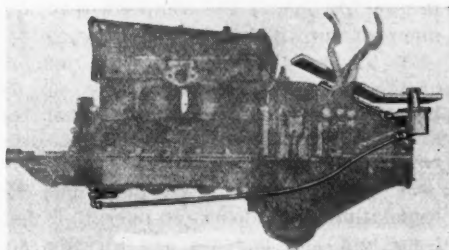


Lock roll adjustable hose clamp

"Hushadoor"



Wollo spark plug



Sight feed oiler for Fords

TELTAILITE

Teltailite is a coil and pilot light to be connected with wiring system of any stop signal and indicates at dash whether signal is operating or not. Becomes part of wiring system.

Pilot light shows just when signal comes on, remains lighted while signal is lighted, and shows just when signal goes out. Is a means to prevent confusion and waste of current in case signal does not cut out when brake is released.

If pilot lamp burns out, which may happen, signal will not be interrupted, but failure of signal for any reason will be shown at dash.

Teltailite coil can be applied to tail light and dash light. Indicates whether or not tail light is burning.

Price \$2. Potter Specialties Co., 140 N. Dearborn St., Chicago.

"HUSHADOOR"

"Hushadoor"—a door cushion for motor cars, which operates on a double-cushioning principle — has been announced as the first product of the new Velguth Metal Parts Co., Milwaukee, Wis.

DEFIANCE ROBE LOCK

For robes, bags, steering wheel, etc. Operates on ratchet with eight tumbler lock. Price \$3.—Universal Products Co., 16 California Street, San Francisco, Cal.

ZELCO PISTON RINGS

Zelco piston rings are made by the Zelco Piston Ring Division, 1600 Kingsland Ave., St. Louis, Mo.

WOLLO SPARK PLUG

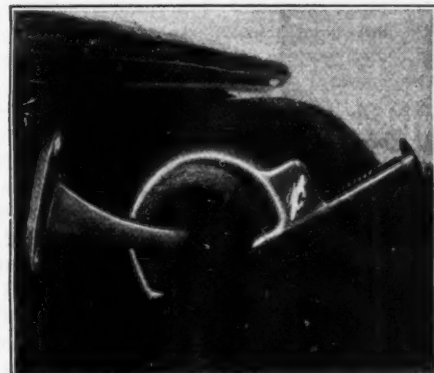
The Wollo spark plug is fitted with copper asbestos gasket, the points are protected in the plug and there is no cement used in the core. The porcelain removes for cleaning. Wollo Ignition Co., 3328 Olive st., St. Louis, Mo.

CORRUGATED INNER TUBE

The Corrugated inner tube is manufactured by Corrugated Rubber Corp., 25 W. Forty-third St., New York City.

GOODRICH SEMI-PNEUMATIC TRUCK TIRE

Goodrich semi-pneumatic truck tire combines the solid rubber element with the air chamber in the middle. B. F. Goodrich Rubber Co., Akron O.



Defiance robe lock

Dupont Analyzes General Motors' Business in 1922

Says Company's Officers Believe Recovery from Depression Is Reasonably Assured—See 1922 as a Year of Successful Business

“**T**HE officers of General Motors Corp. believe that recovery from the depression of 1921 is reasonably assured and look to a successful business in 1922.”

This optimistic statement is the closing paragraph of a communication addressed to the stockholders by President Pierre S. duPont, in submitting to them the final report of the corporation for the fiscal year ended Dec. 31. In his statement duPont says:

“Last year occasion was taken to call attention to the rapid growth of the automobile industry and to compare the volume of sales for the year 1920 with the annual sales of other important products. At that time the country was on the eve of a period of depression and liquidation, the extent of which was beyond accurate prediction. The importance and stability of the automobile industry during such periods had not been tested, therefore the outcome of business for the year 1921 was looked upon with confidence, doubt or apprehension, according to the viewpoint of the individual making the forecast. It must be conceded that the industry as a whole has withstood the test remarkably well.

Registration Figures Show Prominence of Automobile

“In the first place, the increase of registrations of automotive vehicles from 9,211,295 in 1920 to about 10,488,000 in 1921 (an increase of 13 per cent) shows that the generally depressed conditions did not result in disuse of the automobile as a means of transportation. In fact, the number of cars in use actually increased in a period of rapidly declining values, unemployment and general business depression. Secondly, the value of automobiles produced, which stood at \$2,233,000,000 in the banner year of 1920, decreased in 1921 to an estimated \$1,222,000,000, or a decline of about 45 per cent. Thirdly, the number of cars and trucks produced fell from 2,205,000 to 1,680,000, or about 24 per cent. Fourthly, the domestic consumption of gasoline for 1921 as reported by the Bureau of Mines was

4,506,706,000 gallons, an increase of six per cent over 1920.

“The above facts emphasize the importance of the automobile and establish the automotive industry as a permanently important factor in the country's development and activities.

“General Motors Corp. has held its share of the business with respect to the medium and high-grade cars. As a whole, its proportionate volume is slightly less, due to the fact that it is not as large a producer of low-priced cars as those of high and medium grade. The low-price field has naturally been the most active in depressed times; therefore, it is not surprising that General Motors Corp. shows a slight falling off from its average of the industry. However, its maintenance of position in the field is considered satisfactory.

Many Readjustments and Reorganizations Necessary

“Sales of passenger cars, commercial cars and tractors for the year 1921 totalled 214,799, compared with 387,190 in 1920, 406,158 in 1919, 246,834 in 1918 and 324,503 in 1917.

“During the year 1921 it became apparent to the executive committee that the operations of certain divisions were in conflict with newly formulated plans for conducting the business of the corporation. Consequent changes and the reorganization of these divisions on the lines established have resulted in loss, not only in profits, but also through liquidation and scrapping of inventories and the abandonment of car, truck and tractor models not suited to the adopted rules for quality and performance. Some of these changes have been radical, but the executive committee has faced the reorganization without fear and in full confidence that the future would thoroughly justify the complete readjustment of unsatisfactory conditions.

“It has been the effort of the officers of the corporation to knit more closely its different divisions in order that the greatest benefit might result from the co-operative conduct of this large business. Much is left to be done, but the foundation for closer co-operation has been laid and benefits are already accruing. Systematic study has been given

to the relation of the several divisions to each other and duplication or conflict of effort has been avoided. As a whole, much has been accomplished and many plans laid that will develop to the future advantage of the corporation.

“In the last annual report attention was called to the large accumulation of inventories toward the end of the year 1920 and the liquidation that had been accomplished on Jan. 1, 1921. This liquidation has gone steadily forward, so that inventories have been reduced from \$164,684,000 to \$108,762,000 (a reduction of \$55,922,000) during a period of comparatively small sales volume. This liquidation has been accompanied by reduction in payables as follows:

Current accounts payable have been reduced.....	\$ 9,702,000
Notes payable have been reduced	23,446,000

Total reduction in current indebtedness	\$33,148,000
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“The outstanding feature in the report of operations for the year 1921 is liquidation—liquidation forced by the sudden contraction of business to an abnormally low level throughout the United States, in face of declining values. The accomplishment of this liquidation in orderly manner is a tribute to American industry and the officers and employees of General Motors Corp. are to be commended for their effective work in the liquidating program. The corporation met the shock of abnormal retrenchment and stood it well.

Opening of 1922 Compares Favorably with Past Years

“The outlook is now brighter. The year 1922 opens with inventory accounts reduced to current basis and old commitments provided for or adjusted. The opening months of the year show substantial increase in demand and sales, not only with respect to corresponding months of 1921, when business was nearly at a standstill, but also as to several of our divisions even in comparison with the record year of 1920.

“The officers of General Motors Corp. believe that recovery from the depression of 1921 is reasonably assured and look forward with greatest confidence to a successful business year in 1922.”

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Columbia, S. C....Automobile Show	Apr. 17-22
Goldsboro, N. C..Automobile Show	Apr. 18-22
Mitchell, S. D.....Automobile Show	Apr. 20-22
New Brunswick, N. J. ....Automobile Show	Apr. 20-26
Mt. Vernon, Ill..Automobile Show	Apr. 24-30
Chicago	Used Car Show ..Apr. 26-May 4
Red Bank, N. J..Automobile Show	May 6-13
Williamson, W. Va.Automobile Show ..	May 10-13
Hartford, Conn...Automobile Show	Sept. 4-9

FOREIGN SHOWS

Mexico City	Automobile Show	Apr. 16-23
Rio de Janeiro...	Automotive Exhibition	Sept., 1922

CONVENTIONS

Detroit	Automobile Trade Assn.....	May 9-10
Colo. Spgs., Colo..	Automotive Equipment Assn.....	June 9-24
White Sulphur Springs, W. Va...	S. A. E. Summer Meeting.....	June 20-24
Olympia.....	Washington Automotive Trade Assn..	July 21-22

RACES

Indianapolis.....	500-Mile Classic	May 30
Colo. Spgs., Colo..	Pike's Peak Race.....	Sept. 4
San Carlos, Cal...	500-Mile Armistice Day Race.....	Nov. 11

Stewart-Coats Steamer to Sell at \$1085

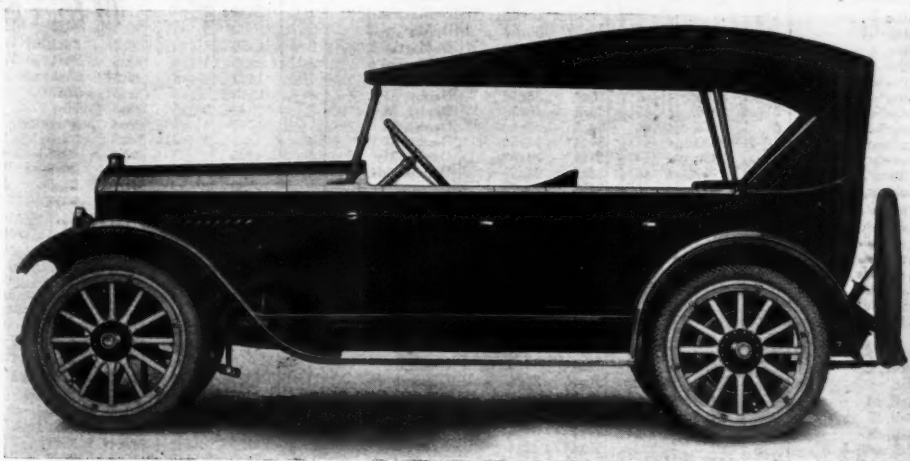
THE Coats steam motor car, to sell at \$1085 is now in production, according to information sent out by the makers, the Y. F. Stewart Motor Car Co., Bowling Green, O. The car will be known as the Stewart-Coats steamer.

The mechanical makeup of the car includes a firetube boiler having 73 sq. ft. of heating surface. The fire box is a cone shaped tube, centrally located and having a diameter of seven and a half in. at the bottom and five and a half in. at the top. The fuel pump is driven by an electric motor which also drives a Sirroco blower. The pump supplies fuel to the atomizing nozzle. The water pump is driven direct from the engine and is said to be of sufficient size to maintain the correct water level at low speed.

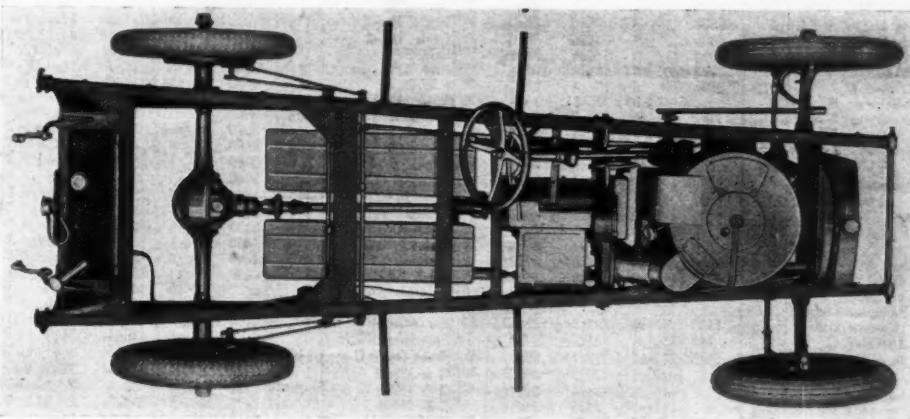
The initial ignition is by means of a heated wire, controlled by a switch. The Sirroco blower furnishes a forced draft at the vaporizing nozzle, completing the combustion in the cone shaped tube of the boiler. The hot gases then are refracted from the fire pan through the 288 flues. Ignition is automatic. When the steam reaches its maximum pressure, the fire is automatically shut off. The control is at all times at the option of the driver. Kerosene is the fuel used. Starting requires one and a half min. to two min. to generate 150 lbs pressure of steam, it is stated, while a full 600 lbs. is available in five min. under average conditions.

The condenser is tubular and fin type. One filling of the water tanks, 30 gals., is said to be sufficient for 250 to 300 miles.

The engine is a three-cylinder horizontal single acting type. Valves are poppet type operated by one camshaft, which handles forward and reversing speed and automatically makes the hook up, or short cut-off of steam. The engine is reversible directly connected to the propeller shaft. The gear ratio in the differential is 2.89 to 1. Lubrication is force feed and splash. The crankshaft



Body lines of the Stewart-Coats steamer. It has a 112 in. wheelbase and resembles very much the conventional type of gasoline driven motor car



Plan view of the Stewart-Coats steamer, showing the location of the boiler, engine and tanks. What appears to be the radiator, is in reality the condenser. Kerosene is used for fuel and is carried in the tank at the rear.

is balanced and carried by two heavy duty type double row ball bearings. The rods are bronze-backed babbitt lined. A silent chain drive is used for the camshaft and generator. All mechanism and moving parts are inclosed in a dust proof housing. The power of the engine is given as 15 h.p. The speed of the car is controlled by a throttle lever on the steering wheel.

DRIVERS' SCHOOL IN CHICAGO

Chicago, April 18—A free motor drivers' school will be conducted here from April 18 to June 27 by the Chicago Safety Council. The classes will be held on alternate Tuesdays from 8 to 9:45 p. m. A special effort is being made to enroll chauffeurs and truck drivers. A similar school last year graduated 469 men employed by 195 business institutions.

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive
				Front Rear						Front Rear						Front Rear	
Acason, RB	1 1/2	\$1050	3 1/2 x 5	34x5 1/2 34x5 1/2	W	Concord, A	2	\$3150	4 x 5 1/2	36x3 1/2 36x6	W	Gary, F	1 1/2-1 3/4	\$2600	3 1/2 x 5	36x3 1/2 36x4	W
Acason, H	1 1/2	1950	3 1/2 x 5 1/2	36x3 1/2 36x6	W	Concord, B	3	3600	4 1/2 x 5 1/2	36x4 36x8	W	Gary, I	2	2900	4 x 5 1/2	36x3 1/2 36x5	W
Acason, L	2 1/2	2750	4 1/2 x 5 1/2	36x4 36x8	W	Concord, AX	3	3250	4 x 5 1/2	36x3 1/2 36x6	W	Gary, J	2 1/2	3800	4 1/2 x 5 1/2	36x4 36x7	W
Acason, M	5	3450	4 1/2 x 5 1/2	36x5 36x10	W	Concord, BX	3	3600	4 1/2 x 5 1/2	36x4 36x8	W	Gary, K	3 1/2	4900	4 1/2 x 5 1/2	36x5 40x6d	W
Ace, C	1 1/2	4350	5 x 6 1/2	36x6 40x12	W	Cook, 51	2 1/2	3600	4 x 5 1/2	36x6 40x8 1/2	W	Gary, M	5	5900	5 x 6 1/2	36x6 40x6d	W
Ace, A	2 1/2	2295	3 1/2 x 5 1/2	34x3 1/2 34x5	W	Corbitt, E-22	1	1480	3 1/2 x 5	34x3 1/2 34x4	W	Gersix, M	1 1/2	3100	4 x 5 1/2	36x3 1/2 36x7	W
Acme, G	1 1/2	2795	4 1/2 x 5 1/2	36x4 36x7	W	Corbitt, D-22	1 1/2	2200	3 1/2 x 5	34x3 1/2 34x4	W	Gersix, K	2 1/2	3500	4 1/2 x 5 1/2	36x4 36x8	W
Acme, B	1 1/2	.....	3 1/2 x 5	35x5 1/2 35x5 1/2	W	Corbitt, C-22	2	2600	4 1/2 x 5 1/2	36x3 1/2 36x6	W	Gersix	3 1/2	4500	4 1/2 x 5 1/2	36x5 40x12	W
Acme, F	1 1/2	.....	3 1/2 x 5	34x3 1/2 34x5	W	Corbitt, B-22	2 1/2	3000	4 1/2 x 5 1/2	36x4 36x7	W	Golden West, GH	3	4500	4 1/2 x 5 1/2	36x7 36x7	W
Acme, AC	2 1/2	.....	4 1/2 x 5 1/2	36x4 36x7	W	Corbitt, A-22	3 1/2-4	3200	4 1/2 x 5 1/2	36x4 36x8	W	Golden West, G	3 1/2	5000	4 1/2 x 5 1/2	36x6 36x6	W
Acme, C	3 1/2	.....	4 1/2 x 5 1/2	36x5 40x10	W	Corbitt, AA-22	5	4500	4 1/2 x 5 1/2	36x5 36x10	W	Graham Bros.	1-Ton	1265	3 1/2 x 5 1/2	33x4 1/2 34x5 1/2	B
Acme, E	5	.....	4 1/2 x 5 1/2	36x6 40x12	W	Day-Elder, AN	1	1600	3 1/2 x 5	35x5 1/2 35x5 1/2	W	Graham Bros.	1 1/2-Ton	1325	3 1/2 x 5 1/2	33x4 1/2 36x6 1/2	B
American, 25	2 1/2	3350	4 x 6	36x4 36x4d	W	Day-Elder, D	1 1/2	2000	3 1/2 x 5	34x3 1/2 34x5	W	Gramm-Pion. 10	1 1/2	1365	3 1/2 x 5	33x5 1/2 33x5 1/2	F
American, 40	4	4275	4 1/2 x 6	36x5 36x5d	W	Day-Elder, C	2 1/2	2400	4 1/2 x 5 1/2	36x4 36x7	W	Gramm-Pion. 15	1 1/2	1900	3 1/2 x 5	36x3 1/2 36x5	J
Apex, G	1 1/2	1450	3 1/2 x 5	33x5 1/2 33x5 1/2	W	Day-Elder, F	3 1/2	2750	4 1/2 x 5 1/2	36x4 36x7	W	Gramm-Pion. 65	1 1/2	2500	3 1/2 x 5	36x3 1/2 36x5	J
Apex, D	1 1/2	1915	3 1/2 x 5 1/2	34x3 1/2 34x4	W	Day-Elder, E	5	3150	4 1/2 x 5 1/2	36x5 36x5d	W	Gramm-Pion. 20	2	2925	4 1/2 x 5 1/2	36x4 36x7	W
Apex, E	2 1/2	2095	4 1/2 x 5 1/2	36x4 36x7	W	Dearborn, E	1	4250	4 1/2 x 6	36x5 40x6d	W	Gramm-Pion. 30	3	3275	4 1/2 x 5 1/2	36x4 36x7	W
Apex, F	3 1/2	3975	4 1/2 x 6	36x5 36x10	W	Dearborn, FX	1 1/2	1600	3 1/2 x 5	35x5 1/2 35x5 1/2	W	Gramm-Pion. 75-P	3 1/2	4225	4 1/2 x 5 1/2	36x6 42x9 1/2	W
Armstrong, 20	1 1/2	2350	3 1/2 x 5 1/2	34x3 1/2 34x5	W	Dearborn, F	1 1/2	2300	3 1/2 x 5 1/2	34x4 34x5	W	Gramm-Pion. 40	4	3995	4 1/2 x 5 1/2	36x5 36x5d	W
Armstrong, 21	1 1/2	2425	3 1/2 x 5 1/2	34x3 1/2 34x6	W	Dearborn, 48	2	2180	3 1/2 x 5 1/2	34x4 34x5	W	Gramm-Pion. 50	5-6	4895	4 1/2 x 6	36x6 40x6d	W
Armstrong, 21	1 1/2	.....	3 1/2 x 5 1/2	34x3 1/2 34x6	W	Defiance, G	1	1695	3 1/2 x 5	35x5 1/2 35x5 1/2	W	Hahn, B2	1	1700	3 1/2 x 5	34x5 34x5	W
Armstrong, HW	2 1/2	3200	4 1/2 x 6	36x5 36x7	W	Defiance, D	1 1/2	2095	3 1/2 x 5	35x5 1/2 36x6 1/2	W	Hahn, O	1 1/2	1990	4 1/2 x 5 1/2	36x3 1/2 36x6	W
Armstrong, KW	2 1/2	4150	4 1/2 x 6	36x5 36x5d	W	Defiance, E	2	2275	3 1/2 x 5	35x5 1/2 38x7 1/2	W	Hahn, K	2	2225	4 1/2 x 5 1/2	36x4 36x8	W
Atco, B	1 1/2	.....	3 1/2 x 5 1/2	34x5 36x6 1/2	W	DeMartini, 1 1/2	1 1/2	2600	4 1/2 x 5 1/2	34x3 1/2 34x6	W	Hahn, L	3	2900	4 1/2 x 5 1/2	36x5 36x10	W
Atco, B1	1 1/2	.....	3 1/2 x 5 1/2	34x5 36x6 1/2	W	DeMartini, 2	2	3300	4 x 5 1/2	36x3 1/2 36x7	W	Hahn, M	5	3500	4 1/2 x 6	36x6 40x12	W
Atco, A	1 1/2	.....	3 1/2 x 5 1/2	36x4 36x8	W	DeMartini, 3	3	4250	4 1/2 x 5 1/2	36x4 36x10	W	Hahn, N	6	4500	4 1/2 x 6	36x6 40x12	W
Atlas, M.D.	2	1185	3 1/2 x 5	32x4 1/2 32x4 1/2	W	DeMartini, 4	4	4800	4 1/2 x 6	36x5 36x12	W	Hal-Fur, E	1 1/2	2350	4 x 5 1/2	34x5 38x7 1/2	W
Atterbury, 20R	1 1/2	2475	3 1/2 x 5	34x3 1/2 34x5	W	Denby, 31	1 1/2	1485	3 1/2 x 5	35x5 1/2 35x5 1/2	W	Hal-Fur, B	2 1/2	3000	4 1/2 x 5 1/2	35x5 38x7 1/2	W
Atterbury, 7CX	1 1/2	3175	4 1/2 x 5 1/2	36x4 36x4d	W	Denby, 33	1 1/2	2145	3 1/2 x 5	35x5 1/2 38x7 1/2	W	Hal-Fur, F	3 1/2	4080	4 1/2 x 5 1/2	36x6 40x10 1/2	W
Atterbury, 7D	3 1/2	3975	4 1/2 x 5 1/2	36x5 40x5d	W	Denby, 34	2	2295	3 1/2 x 5	36x3 1/2 36x6	W	Hall, 1 1/2	1 1/2	3100	3 1/2 x 5	34x5 38x7 1/2	W
Atterbury, 8E	5	4975	4 1/2 x 6	36x5 40x6d	W	Denby, 35	2 1/2-3	2795	4 1/2 x 5 1/2	36x4 36x7	W	Hall, 2 1/2	2 1/2	3275	4 1/2 x 5 1/2	36x4 36x6	W
Autocar, 21UF	1 1/2-2	1950	4 1/2 x 4 1/2	34x4 34x5	D	Denby, 27	4	3895	4 1/2 x 5 1/2	36x5 36x5d	W	Hall, 3 1/2	3 1/2	4100	4 1/2 x 5 1/2	36x5 36x5d	W
Autocar, 21UG	1 1/2-2	2050	4 1/2 x 4 1/2	34x4 34x5	D	Denby, 210	5	4295	4 1/2 x 5 1/2	36x6 40x6d	W	Hall, 5	5	5100	4 1/2 x 5 1/2	36x5 40x6d	W
Autocar, 27H	2	2950	4 x 5 1/2	34x5 36x7	D	Dependable, A	1 1/2	1650	3 1/2 x 5	34x5 36x6	W	Hall, 7 chain	7	5100	4 1/2 x 5 1/2	36x5 40x6d	W
Autocar, 27K2	2	3075	4 x 5 1/2	34x5 36x7	D	Dependable, C	2	2350	3 1/2 x 5 1/2	34x3 1/2 34x5	W	Harvey, WOA	2	2850	4 1/2 x 5 1/2	34x4 34x7	W
Autocar, 26Y	5	3950	4 1/2 x 5 1/2	34x6 36x12	D	Dependable, D	2 1/2	2650	4 x 5 1/2	36x5 36x6	W	Harvey, WFA	2 1/2	2950	4 1/2 x 5 1/2	36x4 36x7	W
Autocar, 26-B	5	4100	4 1/2 x 5 1/2	34x6 36x12	D	Dependable, E	3	2950	4 1/2 x 5 1/2	36x4 36x7	W	Harvey, WHA	3 1/2	3950	4 1/2 x 5 1/2	36x5 36x5d	W
Available, H1 1/2	1 1/2	2475	4 x 5 1/2	36x3 1/2 36x5	W	Diamond T, OS-1	1-1 1/2	1975	3 1/2 x 5 1/2	36x3 1/2 36x4 1/2	W	Hawkeye, K	1 1/2	1850	3 1/2 x 5	34x3 1/2 34x5	I
Available, H2 1/2	2 1/2	3180	4 x 5 1/2	36x4 36x8	W	Diamond T, F	1 1/2	2525	3 1/2 x 5 1/2	36x3 1/2 36x5	W	Hawkeye, M	2	2650	4 1/2 x 5	36x4 36x6	I
Available, H3 1/2	3 1/2	4175	4 1/2 x 5 1/2	36x5 40x5d	W	Diamond T, T	1 1/2	2250	3 1/2 x 5 1/2	36x3 1/2 36x5	W	Hawkeye, N	3 1/2	3700	4 1/2 x 5 1/2	36x5 36x10	I
Available, H5	5	5375	4 1/2 x 6	36x6 40x12	W	Diamond T, U	2-2 1/2	2650	4 x 5 1/2	36x4 36x7	W	Hendricks, O	3 1/2	2000	3 1/2 x 5	36x4 36x5 1/2	W
Avery	1	.....	3 x 4	34x5 1/2 34x5 1/2	I	Diamond T, K	3 1/2	3750	4 1/2 x 5 1/2	36x5 36x5d	W	Hendricks, N	2 1/2	2690	4 1/2 x 5 1/2	36x4 36x7	W
Beck, A Jr.	1	1050	3 1/2 x 5	34x3 1/2 34x4	I	Diamond T, EL	5	4325	4 1/2 x 5 1/2	36x6 40x6d	W	Hendricks, M	3 1/2	3000	4 1/2 x 5	36x5 36x5d	W
Beck, C	2	2550	4 1/2 x 5 1/2	36x4 36x6	I	Diamond T, S	5	4500	4 1/2 x 6	36x6 40x6d	W	Hendricks, K	5	4000	5 x 6 1/2	36x6 40x6	W
Bell	1 1/2	1000	3 1/2 x 5	31x4 1/2 31x4	B	Diehl, A	1	.....	3 1/2 x 5	34x4 1/2 35x5	W	Huffman, B	1 1/2	1995	3 1/2 x 5	34x3 1/2 34x6	W
Bell, M	1 1/2	1495	3 1/2 x 5 1/2	35x5 35x5 1/2	W	Diehl, B	1 1/2	.....	3 1/2 x 5	36x6 36x6	W	Huffman, C	1 1/2	1795	3 1/2 x 5 1/2	34x3 1/2 34x6	I
Bell, E	1 1/2	2100	3 1/2 x 5 1/2	34x3 1/2 34x5	I	Dispatch, F	1	1350	3 1/2 x 5	34x4 1/2 34x4 1/2	I	Hurlburt A	1 1/2	2850	4 x 5 1/2	34x4 34x5	W
Bell, O	2 1/2	2550	4 1/2 x 5 1/2	34x4 34x6	I	Doane	2 1/2	4100	4 1/2 x 5 1/2	36x5 36x7	C	Hurlburt B	2 1/2	3750	4 1/2 x 5 1/2	36x4 36x4d	W
Belmont, A	2 1/2	725	3 1/2 x 4 1/2	31x4 31x4	B	Doane	3 1/2	5100	4 1/2 x 5 1/2	36x5 36x5d	C	Hurlburt C	2 1/2	4590	4 1/2 x 6	36x5 36x5d	W
Belmont, D	2	2575	4 1/2 x 5 1/2	34x3 1/2 34x6	B	Dodge Brothers	3 1/2	6000	5 x 6 1/2	36x6 40x6d	C	Hurlburt D	5	5500	4 1/2 x 6	36x5 40x6d	W
Belmont, F	3	3500	4 x 6	36x5 36x5d	I	Dorris, K-4	2-2 1/2	730	3 1/2 x 4 1/2	32x4 1/2 32x4 1/2	B	Indep'd't (Iowa), B	1	1665	3 1/2 x 5	34x3 1/2 34x4	I
Bassemmer, G	1 1/2	1395	3 1/2 x 5	35x5 1/2 35x5 1/2	I	Dorris, K-7	3 1/2	3400	4 1/2 x 5 1/2	36x4 36x7	W	Indep'd't (Iowa), G	1 1/2	2040	3 1/2 x 5 1/2	34x3 1/2 34x5	I
Bassemmer, H-2	1 1/2	1905	3 1/2 x 5	36x3 1/2 36x5	I	Dart, 103	3 1/2	4400	4 1/2 x 5 1/2	36x5 36x10	W	Indep'd't (La.), H.1	2 1/2	2940	4 1/2 x 5 1/2	36x4 36x4	I
Bassemmer, J-2	2 1/2	2895	4 1/2 x 5 1/2	36x4 36x4d	I	Double Drive B	3	685	3 1/2 x 5	31x4 31x4	B	Indep'd't (Ohio), F	1 1/2	2385	3 1/2 x 5	36x3 1/2 36x5	W
Bassemmer, K-2	4	3495	4 1/2 x 5 1/2	36x5 36x10	I	Duplex, A	1 1/2-2	4000	4 1/2 x 5 1/2	36x5 36x6	W	Indep'd't (Ohio), K	1 1/2	3085	4 1/2 x 5 1/2	36x4 36x4d	W
Big 4, H	3 1/2-4	5000	4 1/2 x 6	36x6 36x6	W	Duplex, E	3 1/2	2775	4 x 5 1/2	35x5 1/2 38x7 1/2	W	Indep'd't (Ohio), K	3 1/2	3985	4 1/2 x 5 1/2	36x5 36x5d	W
Big 4, K	4	5500	4 1/2 x 6	36x6 36x6	W	Duty, 22	2	3500	4 1/2 x 5 1/2	36x8 36x8	I	Indiana, 12	1 1/2	.....	4 1/2 x 5 1/2	34x3 1/2 34x5	W
Big 4, HA	7	6000	5 1/2 x 6	36x6 36x6	W	Eagle, 100-X	1 1/2	1590	3 1/2 x 5	34x3 1/2 34x5	I	Indiana, 20	2	.....	4 1/2 x 5 1/2	36x4 36x7	W
Brinton, C	1 1/2	1500	3 1/2 x 5	34x4 34x5	W	Eagle, 100-2	2	.....	3 1/2 x 5 1/2	34x4 34x5	I	Indiana, 25	2 1/2	.....	4 1/2 x 5 1/2	36x4 36x8	W
Brinton, D	2 1/2	2250	4 1/2 x 5 1/2	36x4 36x7	W	Erie, E	1 1/2	2275	3 1/2 x 5 1/2	34x4 34x7	I	Indiana, 35	3 1/2	.....	4 1/2 x 5 1/2	36	

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL										NAME AND MODEL										NAME AND MODEL									
Tons Capacity		Chassis Price		TIRES		Final Drive		Tons Capacity		Chassis Price		TIRES		Final Drive		Tons Capacity		Chassis Price		TIRES		Final Drive							
				Front Rear								Front Rear								Front Rear									
Kimball, AF	5	\$5500	5 x 6	36x6	40x7d	W	O. K., M1	3 1/2	\$4250	4 1/2 x 6	36x5	36x5d	W	Signal, M	3 1/2	\$3675	4 1/2 x 5 1/2	36x5	40x5d	W									
Kissel, Express	1 1/2	1935 1/2	3 1/2 x 5 1/2	34x5 1/2	34x5 1/2	W	Ogden, D	1 1/2	....	3 1/2 x 5	36x3 1/2	36x5	W	Signal, R	1	4400	4 1/2 x 6	36x6	40x6d	W								
Kissel, Utility	1 1/2	1975	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Ogden, D	1 1/2	....	3 1/2 x 5	36x3 1/2	36x5	W	Southern, 10	1	2900	3 1/2 x 5	34x3 1/2	34x4	W								
Kissel, Freight	2 1/2	2975	4 1/2 x 5 1/2	36x4	36x7	W	Ogden, E	2 1/2	....	4 1/2 x 5 1/2	36x4	36x5	W	Southern, 15	1 1/2	2500	3 1/2 x 5 1/2	36x6 1/2	34x4	W								
Kissel, H. D.	4	3675	4 1/2 x 5 1/2	36x5	36x5d	W	Old Hickory, W	1	1775	3 1/2 x 5	36x3 1/2	36x4*	W	Southern, 20	2	2900	4 1/2 x 5 1/2	34x3 1/2	34x5*	W									
Kleiber, AA	1	2209	4 1/2 x 5 1/2	34x3 1/2	34x5*	W	Old Reliable, A	1 1/2	2350	4 x 5	34x4	36x6	W	Standard, 1-K	1 1/2	1600	3 1/2 x 5	36x4*	36x5*	W									
Kleiber, B	1 1/2	3100	4 1/2 x 5 1/2	36x3 1/2	36x6*	W	Old Reliable, B	2 1/2	3500	4 1/2 x 6	34x4	36x4d	W	Standard, 76	2 1/2	2400	4 1/2 x 5 1/2	36x4*	36x7*	W									
Kleiber, BB	2	3600	4 1/2 x 5 1/2	36x4*	36x7*	W	Old Reliable, C	3	4250	4 1/2 x 6	36x5	36x5d	W	Standard, 66	3 1/2	3150	4 1/2 x 5 1/2	36x5	36x10	W									
Kleiber, B	2 1/2	3950	4 1/2 x 5 1/2	36x5*	36x8*	W	Old Reliable, D	5	5250	4 1/2 x 6	36x6	40x6d	W	Standard, 5-K	5-7	4400	4 1/2 x 6	36x6	40x12	W									
Kleiber, C	3	4600	4 1/2 x 5 1/2	36x5	36x5d	W	Old Reliable, KLM	7	6000	4 1/2 x 6	36x6	40x7d	C	Sterling, 1 1/2	1 1/2	2885	4 x 5 1/2	36x3 1/2	36x5*	W									
Kleiber, D	5	5300	5 x 6 1/2	36x6	40x12	W	Oldsmobile Econ.	1	1095	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	I	Sterling, 2 1/2	2 1/2	3085	4 x 5 1/2	36x4	36x6*	W									
Koehler, D	1 1/2	1995	3 1/2 x 5	34x3 1/2	34x5	W	Olympic, A	2	3200	3 1/2 x 5	36x4	36x8	W	Sterling, 3 1/2	3 1/2	4325	4 1/2 x 5 1/2	36x5*	40x5d*	W									
Koehler, M	2 1/2	3175	4 x 5 1/2	36x4	36x7	W	Oshkosh, A	2	3750	3 1/2 x 5	36x6 1/2	36x6 1/2	4	Sterling, 5-C	5	4950	5 x 6 1/2	36x6*	40x6d*	W									
Koehler, MCS	2 1/2	3275	4 x 5 1/2	36x4	36x7	W	Oshkosh, AA	2 1/2	3850	3 1/2 x 5	36x6 1/2	36x6 1/2	4	Sterling, 5-W	5	5500	5 x 6 1/2	36x6	40x6d	C									
Koehler, F	3 1/2	4150	4 1/2 x 5 1/2	36x5	36x10	W	Oshkosh, B	2 1/2	4150	4 x 5 1/2	36x7	36x7	4	Sterling, 7 1/2	7 1/2	6000	5 x 6 1/2	36x6	40x7d	C									
Koehler, MT, Trac	5	3275	4 x 5 1/2	36x4	36x7	W	Oshkosh, BB	2 1/2	4300	4 x 5 1/2	36x7	36x7	4	Stewart, 14	1 1/2	1195	3 1/2 x 5 1/2	32x4 1/2	32x4 1/2	I									
Lange, B	2 1/2	3350	4 1/2 x 5 1/2	36x4*	36x7*	C	Packard, EC	1 1/2-3	3100	4 1/2 x 5 1/2	36x4	36x7	W	Stewart, 15	1 1/2	1395	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	I									
Larrabee, X-Z	1	1925	3 1/2 x 5 1/2	34x5 1/2	34x5 1/2	B	Packard, EX	1 1/2	3100	4 1/2 x 5 1/2	36x6 1/2	40x8	W	Stewart, 7	2	2090	4 1/2 x 5 1/2	34x4	34x7	I									
Larrabee, U	1 1/2	2100	3 1/2 x 5	34x5 1/2	34x5	W	Packard, ED	2 1/2-4 1/2	4100	4 1/2 x 5 1/2	36x5	36x5d	W	Stewart, 7-X	2 1/2	2290	4 1/2 x 5 1/2	34x4	34x7	I									
Larrabee, J	1 1/2-2 1/2	2400	3 1/2 x 5	34x3 1/2	34x5*	W	Packard, EF	4-7 1/2	4500	5 x 5 1/2	36x6	40x6d	W	Stewart, 10	3 1/2	3090	4 1/2 x 5 1/2	36x5	36x5d	I									
Larrabee, K	2 1/2	3100	4 1/2 x 5 1/2	36x4	36x7	W	Paige, 52-19	1 1/2	1950	4 x 5 1/2	34x3 1/2	34x5	W	Stewart, 10-X	3 1/2	3850	4 1/2 x 6	36x5	36x5d	W									
Larrabee, K-5	2 1/2-3	3450	4 1/2 x 5 1/2	36x4	36x8	W	Paige, 54-20	2 1/2	2420	4 1/2 x 5 1/2	34x4	34x8	W	Stoughton, C	1	1240	3 1/2 x 5	34x4 1/2	34x4 1/2	W									
Larrabee, L-4	3 1/2	4000	4 1/2 x 5 1/2	36x5	36x5d	W	Paige, 51-18	3 1/2	3145	4 1/2 x 5 1/2	36x5	36x5d	W	Stoughton, F	1 1/2	1790	3 1/2 x 5 1/2	34x4 1/2	35x5 1/2	W									
Larrabee, L-5	3 1/2-5	4400	4 1/2 x 6	36x5	36x10	W	Parker, F20	2	3500	4 x 6	34x4	36x4d	W	Stoughton, B	1 1/2	2150	3 1/2 x 5 1/2	36x3 1/2	36x5	W									
Luedinghaus, C	1	1690	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Parker, J20	3 1/2	4400	4 1/2 x 6	36x5	40x5d	W	Stoughton, D	2	2490	4 x 5 1/2	36x4	36x7	W									
Luedinghaus, W	1 1/2	2490	3 1/2 x 5 1/2	34x3 1/2	34x5*	W	Parker, M20	5	5500	4 1/2 x 6	36x6	40x6d	W	Stoughton, E	3	3150	4 1/2 x 5 1/2	36x5d	36x5d	W									
Luedinghaus, K	2-2 1/2	2790	4 1/2 x 5 1/2	36x4*	36x7*	W	Patriot, Reverse	1	1500	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Sullivan, E	2	2800	4 1/2 x 5 1/2	36x5	36x5d	W									
Maccari, L	2	2700	4 1/2 x 5 1/2	36x4	36x6	W	Patriot, Lincoln	2	2050	4 x 5 1/2	34x3 1/2	34x5	W	Sullivan, H	3 1/2	3750	4 1/2 x 6	36x5	36x5d	W									
Maccari, H-A	2	3100	4 1/2 x 5 1/2	36x4	36x6d	W	Patriot, Wash'n	3	2900	4 1/2 x 5 1/2	36x4	36x7	W	Superior, D	1	1650	3 1/2 x 5	34x4 1/2	34x4	I									
Maccari, H-2	3	3400	4 1/2 x 5 1/2	36x4	36x5d	W	Piedmont, 4-30	1	1200	3 1/2 x 5	34x4 1/2	34x4 1/2	W	Superior, E	2	2600	4 1/2 x 5 1/2	36x4	36x6	I									
Maccari, H-3	4	4200	4 1/2 x 5 1/2	36x5	36x6d	W	Pierce-Arrow	2	3200	4 x 5 1/2	36x4	36x4d	W	Super Truck, 50	2 1/2	3300	4 x 6	36x4	36x8	W									
Maccari, G	5-6	4950	4 1/2 x 6	36x5	40x6d	W	Pierce-Arrow	3 1/2	4350	4 1/2 x 6 1/2	36x5	36x5d	W	Super Truck, 70	3 1/2	4300	4 1/2 x 6	36x5	40x5d	W									
MacDonald, A	7 1/2	5750	5 x 6	40x7	40x14	I	Pioneer, 59	5	4850	4 1/2 x 6 1/2	36x5	40x6d	W	Super Truck, 100	5	5300	4 1/2 x 6	36x5	40x12	W									
Mack, AB D.R.	1 1/2	3150	4 x 5	36x4	36x3 1/2	I	Pittsburgh	1 1/2-2	3000	3 1/2 x 5	36x4	36x6	W	Super Truck, 150	7 1/2	6300	5 x 6	36x6	40x7d	W									
Mack, AB Chain	1 1/2	3000	4 x 5	36x4	36x3 1/2	I	Pittsburgh	3	3800	4 1/2 x 5 1/2	36x5*	36x8	W	Texas, A38	3 1/2	1095	3 1/2 x 5	33x4	33x4	I									
Mack, AB Chain	2	3300	4 x 5	36x4	36x4d	C	Power, F	2	3150	3 1/2 x 5 1/2	36x5	36x7	W	Texas, TK39	1 1/2	1550	3 1/2 x 5	36x6	36x7	W									
Mack, AB D.R.	2 1/2	3750	4 x 5	36x4	36x4d	D	Power, C	3 1/2	4250	4 1/2 x 5 1/2	36x5	40x10	W	Thomart Speed T	1 1/2	1795	4 x 5 1/2	34x5	36x5	B									
Mack, ABDR	2 1/2	3850	4 x 5	36x4	36x4d	D	Prepacar, B-143	1 1/2	2475	3 1/2 x 5	36x6 1/2	36x6 1/2	W	Tiffin, GW	1 1/2	2100	4 1/2 x 5 1/2	36x3 1/2	36x5	W									
Mack, AB	2 1/2	3400	4 x 5	36x4	36x4d	C	Rainier, K-21	1 1/2	1990	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Tiffin, MW	2 1/2	2700	4 1/2 x 5 1/2	36x4	36x3 1/2	W									
Mack, AC Chain	3 1/2	4050	5 x 6	36x5	40x5d	C	Rainier, R-19	1	2150	3 1/2 x 5	34x3 1/2	34x5	W	Tiffin, PW	3 1/2	3600	4 1/2 x 6	36x5	40x6d	W									
Mack, AC Chain	5	4500	5 x 6	36x6	40x6d	C	Rainier, R-16	1 1/2	2490	3 1/2 x 5	34x3 1/2	34x6	W	Tiffin, F50	5	4300	4 1/2 x 6	36x6	40x12	W									
Mack, AC Chain	6 1/2	5750	5 x 6	36x6	40x12	C	Rainier, R-18	2	2890	4 1/2 x 5 1/2	34x4	34x7	W	Tiffin, F60	6	4500	4 1/2 x 6	36x6	40x12	W									
Mack, AC Chain	7 1/2	6000	5 x 6	36x7	40x7d	C	Rainier, R-20	2 1/2	3550	4 1/2 x 5 1/2	34x4	34x7	W	Titan	2	2950	4 1/2 x 5	34x4*	36x7*	I									
Mack Trac, AB	5	3100	1 x 6	36x4	36x4d	C	Rainier, R-15	3 1/2	4400	4 1/2 x 5 1/2	36x5	36x5d	W	Titan	3 1/2	3950	4 1/2 x 5 1/2	36x5	40x10	I									
Mack Trac, AC	7	4950	5 x 6	3																									

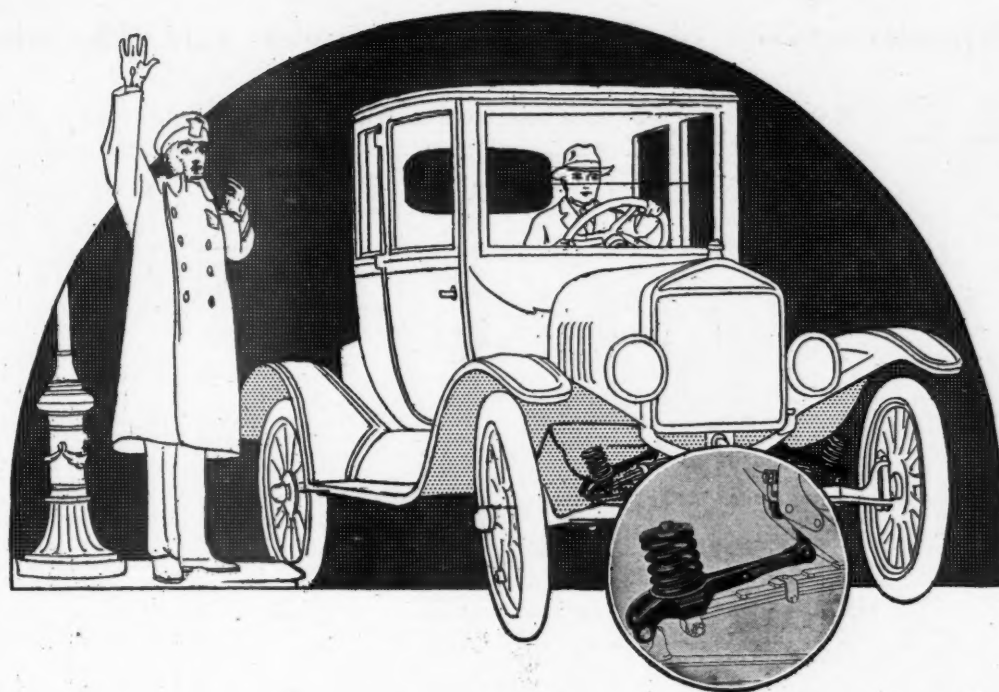
Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
				Front	Rear						Front	Rear						Front	Rear	
Walter, S	5	\$4850	4 1/2 x 6 1/2	36x6	40x6 1/2	W	Wichita, RK	3	\$3200	4 1/2 x 6 1/2	36x4	36x8	W	Winther, 39	1 1/2	\$2450	3 1/2 x 5	34x3 1/2	34x5	1
Ward-Laf., 2B	2 1/2	2990	4 1/2 x 5 1/2	36x4	36x4 1/2	W	Wichita, O	4	3500	4 1/2 x 6 1/2	36x5	36x5 1/2	W	Winther, 40	2	3250	4 x 5	34x4	34x4 1/2	1
Ward-Laf., 4A	5	3990	4 1/2 x 6 1/2	36x5	36x5 1/2	W	Wilcox, AA	1	1900	3 1/2 x 5 1/2	36x1	36x1	W	Winther, 50	2 1/2	3995	4 x 6	38x7 1/2	42x1 1/2	1
Ward-Laf., 5A	6	4590	5 x 6 1/2	36x6	40x6 1/2	W	Wilcox, BB	1 1/2	2550	4 1/2 x 5	36x4	36x5	W	Winther, 70	3 1/2	4200	4 x 6	36x5	36x5 1/2	1
Watson, B	1	1685	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	W	Wilcox, D	2 1/2	3000	4 1/2 x 5	36x4	36x3 1/2	W	Winther, 450	2 1/2	3690	4 x 5	34x5	36x6	1
Watson, N	3 1/2	3825	4 1/2 x 5 1/2	36x5	36x10	W	Wilcox, E	3 1/2	3950	4 1/2 x 6	36x5	36x5 1/2	W	Winther, 109	5	5250	4 1/2 x 6	36x6	40x5 1/2	1
Western, W1 1/2	1 1/2	2550	4 1/2 x 5 1/2	36x3 1/2	36x5	W	Wilcox, F	5	4350	4 1/2 x 5 1/2	36x5	40x6 1/2	W	Winther, 140	7	5900	5 x 6	36x6	40x7 1/2	1
Western, L1 1/2	1 1/2	2550	4 1/2 x 5 1/2	36x5	36x5	W	Wilson, EA	1 1/2	2270	3 1/2 x 5	36x3 1/2	36x5	W	Wisconsin, A	1	1750	3 1/2 x 5	34x5 1/2	34x5 1/2	W, B
Western, W2 1/2	2 1/2	3250	4 1/2 x 5 1/2	36x4	36x7	W	Wilson, G	2 1/2	2825	4 1/2 x 5 1/2	36x4	36x7	W	Wisconsin, B	1 1/2	2100	3 1/2 x 5	35x5	36x6	W
Western, L2 1/2	2 1/2	3250	4 1/2 x 5 1/2	36x4	36x7	W	Wilson, H	3 1/2	3695	4 1/2 x 5 1/2	36x5	36x5	W	Wisconsin, C	2 1/2	2700	4 x 5 1/2	36x6 1/2	36x7	W
Western, W3 1/2	3 1/2	4250	4 1/2 x 5 1/2	36x5	40x5 1/2	W	Winther, 430	1	1795	3 1/2 x 5	36x4	36x5	W	Wisconsin, D	3	3000	4 1/2 x 5 1/2	36x6 1/2	40x8	W
White, 15	2	2400	3 1/2 x 5 1/2	34x5 1/2	34x5 1/2	D	Winther, 430	1 1/2	2850	3 1/2 x 5	32x4	32x4	I	Wisconsin, E	5	3500	4 1/2 x 6 1/2	36x6	36x10	W
White, 20	2 1/2	3250	4 1/2 x 5 1/2	36x4	36x7	D								Wisconsin, F	7	4000	5 x 6 1/2	36x6	36x12	W
White, 40	4	4200	4 1/2 x 5 1/2	36x5	40x5 1/2	D								Witt-Will, N	1 1/2	2250	3 1/2 x 5	36x3 1/2	36x5	W
White, 45	4 1/2	4500	4 1/2 x 5 1/2	36x5	40x5 1/2	D								Witt-Will, P	1 1/2	2750	4 1/2 x 5 1/2	36x3 1/2	36x7	W
White Hick, E	1	1225	3 1/2 x 5	34x5 1/2	34x5 1/2	W								Wolverine, J	1 1/2	2125	3 1/2 x 5	34x3	34x4	W
White Hick, H	1 1/2	1375	3 1/2 x 5	36x3 1/2	36x5	W								Wolverine, J	1 1/2	2375	3 1/2 x 5	34x3 1/2	34x5	1
White Hick, K	2 1/2	1675	4 1/2 x 5 1/2	36x4	36x5	W								Wolverine, J	2	2640	3 1/2 x 5	34x4	34x7	1
Wichita, K	1	1875	3 1/2 x 5 1/2	36x3 1/2	36x4	W								Wolverine, J	2 1/2	3400	4 1/2 x 5 1/2	36x5	36x10	1
Wichita, M	2	2400	3 1/2 x 5 1/2	36x3 1/2	36x6	W								Wolverine, L	3 1/2	4125	4 1/2 x 5 1/2	36x5	36x10	1

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl.
Trac., Tractor. **Canadian made.
Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid.
†Price includes body. \$—Price includes several items of equipment.

Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Flow Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Flow Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Flow Capacity
Allis-Chalm. B	6-12	.....	2	LeR.	4-3 1/2 x 4 1/2	Gas.	1	Franklin... G2	18-30	\$1350	2	Clim.	4-5 x 6 1/2	G or K	3-4	Pioneer..... G	20-40	\$1750	4	Own	4-5 1/2 x 6	G, K, D	4
Allis-Chalm. G.P.	15-25	\$1350	2	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Frisk..... A	12-20	.....	4	Erdr.	4-4 x 6	G, K	2-3	Pioneer..... C	40-75	3550	4	Own	4-7 x 8	Gas.	10
Allis-Chalm. L	20-35	1885	4	Own	4-4 1/2 x 6 1/2	G or K	3-4	Frisk..... C	15-28	.....	4	Beav.	4-4 1/2 x 6	G, K	3-4	Plowman..... A	15-30	1295	4	Buda	4-4 1/2 x 6	Gas.	3-4
Allis-Chalm. M	20-35	2085	4	Own	4-4 1/2 x 6 1/2	G, K	4																
Allwork... 2-G	14-28	1695	4	Own	4-4 1/2 x 6	G or K	3	Grain Belt... A	18-36	2150	4	Wauk.	4-4 1/2 x 6 1/2	G or K	4	Reliable.....	10-20	685	4	Own	2-6 x 7	Ker.	2
Allwork... C	14-28	1395	4	Own	4-5 x 6	G or K	3	Gray..... 1920	18-36	2000	3	Wauk.	4-4 1/2 x 6 1/2	Gas.	4	Rex.....	12-25	1600	4	Wauk.	4-4 1/2 x 5 1/2	G or K	3
Andrews-Kin. D	18-36	2570	4	Clim.	4-5 x 6 1/2	G or K	4	Gt. Western St.	20-30	1950	4	Beav.	4-4 1/2 x 6	G, K	4	Russell.....	12-24	1500	4	Own	4-4 1/2 x 5 1/2	G or K	2-3
ARO... 1921-22	3-5	385	4	Own	1-1 1/2 x 5	Gas.	1																
Aultman-T... 1	15-30	2200	4	Clim.	4-5 x 6 1/2	G, K	4	Hart-Parr... 20	20	945	4	Own	2-5 1/2 x 6 1/2	K, D	2	Russell.....	15-30	2200	4	Own	4-5 x 6 1/2	G or K	3-4
Aultman-T... 2	22-45	3420	4	Own	4-5 x 6 1/2	G, K	6	Hart-Parr... 30	30	1295	4	Own	2-6 1/2 x 7	K, D	3	Russell.....	20-35	3000	4	Own	4-5 1/2 x 7	G or K	4-5
Aultman-T... 3	30-60	4500	4	Own	4-7 x 9	G, K, D	8-10	Heider..... D	9-16	870	4	Wauk.	4-4 1/2 x 6 1/2	G, K	3	Russell.....	30-60	5000	4	Own	4-8 x 10	G or K	9-10
Automot. B-3	12-24	1785	4	Herec.	4-4 1/2 x 5 1/2	Gas.	2-3	Heider..... C	12-20	900	4	Wauk.	4-4 1/2 x 6 1/2	G, K	3	Samson..... M	.....	445	4	Own	4-4 x 5 1/2	G, K	2
Avery, S.R. Cult.	5-10	.....	4	Own	4-3 x 4	G, K	1	Heider..... Cult	5-10	800	4	LeR.	4-3 1/2 x 4 1/2	Gas.	1	Sandusky... J	10-20	1250	4	Own	4-4 1/2 x 5 1/2	G, K, D	2
Avery, Cult-C	5-10	.....	3	Own	4-3 x 4	G, K	2	Huber Light 4	12-25	1185	4	Wauk.	4-4 1/2 x 5 1/2	G or K	3	Sandusky... E	15-35	1750	4	Own	4-5 x 6 1/2	G, K, D	4
Avery..... B	5-10	.....	4	Own	4-3 x 4	G, K	2	Huber Super 4	15-30	1885	4	Midw.	4-4 1/2 x 6	Gas.	3	Shelby..... D	15-30	.....	4	Beav.	4-4 x 6	G, K	3
Avery..... C	8-10	.....	4	Own	4-3 x 4	G, K	2-3																
Avery.....	8-10	.....	4	Own	2-5 1/2 x 6	G, K, D	2-3	Illinois, Super-	15-30	.....	4	Clim.	4-5 x 6 1/2	G, K	4	Shelby..... C	9-18	.....	4	Wauk.	4-3 1/2 x 5 1/2	G or K	2
Avery.....	12-20	.....	4	Own	4-4 1/2 x 6	G, K, D	3-4	Imperial... C	40-70	4500	4	Own	4-5 x 6 1/2	G, K, D	10	Steady Pull	12-21	1485	4	Own	4-4 x 5	Gas.	3
Avery.....	12-25	.....	4	Own	4-4 1/2 x 6	G, K, D	3-4	Indiana... F	5-10	665	2	LeR.	4-3 1/2 x 5 1/2	Gas.	1-2	Stinson... 4E	18-36	1835	4	Beav.	4-4 1/2 x 6	G, K	4
Avery.....	14-28	.....	4	Own	4-4 1/2 x 6	G, K, D	3-4	International	8-16	1670	4	Own	4-4 1/2 x 5	G, K, D	2	Tiegs... 3	15-27	1985	4	Wise.	4-4 1/2 x 6	Gas.	3-4
Avery.....	18-36	.....	4	Own	4-5 1/2 x 6	G, K, D	4-5	Internal Titan	10-20	1700	4	Own	4-5 1/2 x 8	G, K, D	4	Topp... B	30-45	3500	4	Wauk.	4-4 1/2 x 6 1/2	Gas.	3-4
Avery.....	25-50	.....	4	Own	4-6 1/2 x 7	G, K, D	5-6	International...	15-30	1503	2	Own	4-4 1/2 x 6	G, K, D	3	Toro Cultivator	6	750	3	LeR.	4-3 1/2 x 4 1/2	Gas.	2
Avery.....	45-65	.....	4	Own	4-7 1/2 x 8	G, K, D	9-10	Internal...	15-30	1503	2	Own	4-4 1/2 x 6	G, K, D	3	Toro Tractor 22	6-10	495	3	LeR.	4-3 1/2 x 4 1/2	Gas.	2
Bates Mule, H	15-25	.....	4	Midw.	4-4 1/2 x 5 1/2	Gas.	3	J-T..... N	20-40	.....	2	Chief.	4-4 1/2 x 6	G, K, D	3-4	Townsend...	10-20	750	2	Own	4-6 1/2 x 7	Ker.	2-3
Bates Mule, F	18-25	.....	2	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Lauson..... 5	12-25	1495	4	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Townsend...	15-30	1350	2	Own	4-7 x 8	Ker.	3-4
Bates Mule, G	25-35	.....	2	Midw.	4-4 1/2 x 6	Gas.	3	Lauson..... 20	15-25	1885	4	Beav.	4-4 1/2 x 6	G or K	3	Townsend...	25-50	2500	2	Own	4-8 1/2 x 10	Ker.	4-8
Beeman... G	2-4	240	4	Own	1-3 1/2 x 4 1/2	Gas.	1	Lauson..... 21	15-30	1985	4	Beav.	4-4 1/2 x 6	G or K	3-4	Traction Motor	40-50	.....	4	Own	8-3 1/2 x 5	Gas.	4-5
Best.....	18-30	3100	2	Own	4-4 1/2 x 6 1/2	G, K, D	4	Lauson Road	15-30	2225	4	Beav.	4-4 1/2 x 6	K	.....	Traylor... TB	6-12	715	4	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2
Best.....	60	5450	2	Own	4-6 1/2 x 8 1/2	G, K, D	8-9	Leader..... B	12-18	685	4	Own	2-6 x 6 1/2	G, K, D	2-3	Trundar... 10	25-40	3750	2	Wauk.	4-5 x 6 1/2	G or K	4
Boring... 1921	18-30	1850	3	Wauk.	4-4 1/2 x 6 1/2	G or K	2	Leader..... M	16-32	1725	4	Clim.	4-5 x 6 1/2	G, K	3-4	Twin City...	12-20	1200	4	Own	4-4 1/2 x 6	G, K	3
Burns-Oil, 1922	15-30	1435	4	Own	2-6 1/2 x 7	Ker.	3-4	Leader... GU	18-36	2150	2	Clim.	4-5 x 6 1/2	G, K	3-4	Twin City...	20-35	2950	4	Own	4-5 1/2 x 6 1/2	G, K	5
								Linn... HAJ	40	4500	2	Cont.	4-4 1/2 x 6 1/2	Gas.	4	Twin City...	40-65	4750	4	Own	4-7 1/2 x 9	G, K	8
Capital.....	15-30	1000	2	Own	4-4 x 6	Gas.	3	Linn... W	60	5000	2	Wauk.	4-5 x 6 1/2	Gas.	4	Uncle Sam C20	12-20	1385	4	Weid.	4-4 x 5 1/2	G, K	2-3
Case.....	10-18	700	4	Own	4-3 1/2 x 5	G or K	2	Little Giant, B	16-22	2200	4	Own	4-4 1/2 x 5	K	4	Uncle Sam B19	20-30	2300	4	Beav.	4-4 1/2 x 6	G or K	3-4
Case.....	15-27	1320	4	Own	4-4 1/2 x 6	G or K	3-4	Little Giant, A	26-35	3300	4	Own	4-5 1/2 x 6	K	6	Uncle Sam D21	20-30	1985	4	Beav.	4-4 1/2 x 6	G or K	3-4
Case.....	22-40	2550	4	Own	4-5 1/2 x 6 1/2	G or K	4-5	Lombard 1921	35-150	.....	2	Own	6-5 1/2 x 8 1/2	Gas.	16	Utilitor... 501	2 1/2-	295	4	Own	1-3 1/2 x 4 1/2	G	1
Case... 40-72	40-72	.....	4	Own	7 x 8	G, K, D	8-10	Lombard 1921	50	.....	2	Own	4-4 1/2 x 6 1/2	Gas.	10								
Caterpillar T11	25	3975	2	Own	4-4 1/2 x 6	Gas.	4																
Caterpillar T16	40	6050	2	Own	4-6 1/2 x 7	Gas.	6	Master Jr... 5	5-10	585	2	LeR.	2-2 1/2 x 4	Gas.	1	Vim..... B	15-30	1190	4	Wauk.	4-4 1/2 x 5 1/2	G, K	3
Centaur...	5-2 1/2	385	2	N Way	2-4 1/2 x 4 1/2	G or K	1	MerryGar1922	2	210	2	Evin	1-2 1/2 x 2 1/2	Gas.	.....	Wallis... K	15-25	1995	4	Own	4-4 1/2 x 5 1/2	G, K	3
Chicago... 40	40	2500	4	Own	4-4 1/2 x 6	Gas.	4	Minne... All-P	12-25	900	4	Own	4-4 1/2 x 7	G or K	3	Waterloo... N	12-25	675	4	Own	2-6 1/2 x 7	G, K	3
Cletrac... F	9-16	595	2	Own	4-3 1/2 x 4 1/2	G, K, D	2	Minne... Gen-P	17-30	1675	4	Own	4-4 1/2 x 7	G or K	3-4	Wetmore21-22	12-25	1185	4	Wauk.	4-4 x 5 1/2	G, K	3
Cletrac... W	12-20	1345	2	Own	4-4 x 5 1/2	G, K, D	2-3	Minne...															
								Med.Duty	22-44	3000	4	Own	4-6 x 7	G or K	5-6	Whitney... D	9-18	595	4	Own	2-5 1/2 x 6 1/2	G, K	3
Dakota..... A	15-27	1500	3	Dom.	4-4 1/2 x 6	Gas.	4	Minne...															
Deppue... A	20-30	2500	4	Buda	4-4 1/2 x 6	Gas.	3	HeavyDuty	35-70	4150	4	Own	4-7 1/2 x 9	G or K	8-9	Wichita... T	15-30	2500	4	Beav.	4-4 1/2 x 6	G, K, D	3-4
Dill..... D	20	2380	4	Cont.	4-4 1/2 x 5 1/2	Gas.	3	Mohawk 1921	8-16	735	2	Light	4-3 1/2 x 4 1/2	K or G	1-2	Wisconsin... E	16-30	1850	4	Clim.	4-5 x 6 1/2	G or K	4
Dill..... R.W.	20	2980	4	Midw.	4-4 1/2 x 6	Gas.	3	Moline Univ D	9-18	990	2	Own	4-3 1/2 x 5	Gas.	2-3	Wisconsin... F	20-40	2050	4	Wauk.	4-5 x 6 1/2	G or K	4
Do-It-All... A	3-6	595	.....	Own	1-4 1/2 x 5	Gas.	1	Moline Orch	9-18	990	2	Own	1-2 1/2 x 3 1/2	Gas.	.....	Wisconsin... H	22-40	2550	4	Clim.	4-6 1/2 x 7	G or K	4-6
								Motor Macult.	1 1/2	195	2	Own	1-2 1/2 x 3 1/2	Gas.	.....							
Eagle..... F	12-22	.....	4	Own	2-7 x 8	G or K	3-4	NB..... 1	3-6	425	4	Own	2-3 1/2 x 4	Gas.	1	Yuba... 12-20	12-20	2400	2	Wise.	4-4 1/2 x 6 1/2	G, K, D	3
Eagle.....	16-30	.....	4	Own	2-8 x 8	G or K	4-5	Nichols-Shep.	20-42	2650	4	Own	8 x 10	G or K	3-6	Yuba... 15-25	15-25	2750	2	Wise.	4-4 1/2 x 6	G, K, D	3
E-B... AA	12-20	1095	4	Own	4-4 1/2 x 5	G, K, D	3	Nichols-Shep.	20-42	2650	4	Own	8 x 10	G or K	3-6	Yuba... 23-35	20-35	3900	2	Wise.	4-5 1/2 x 7	G, K, D	4
E-B... Q	12-20	750	4	Own	4-4 1/2 x 5	G, K, D	3	Nichols-Shep.	20-42	2650	4	Own	8 x 10	G or K	3-6	Yuba... 25-40	25-40	4250	2	Wise.	4-5 1/2 x 7	G, K, D	4
E-B... Q	16-32	1750	4	Own	4-5 1/2 x 7	G, K, D	3	Nichols-Shep.	20-42	2650	4	Own	8 x 10	G or K	3-6	Yuba... 25-40	25-40	4250	2	Wise.	4-5 1/2 x 7	G, K, D	4
Eagle..... D	9-18	1525	4	Lye.	4-3 1/2 x 5	Gas.	2	Nichols-Shep.	25-50	3000	4	Own	9 x 12	G or K	4-7	Zelle.....	13-25	.....	4	Buda	4-4 1/2 x 5 1/2	G or K	3
Farm Horse. B	18-30	1885	4	Clim.	4-5 x 6 1/2	G, K	4	Nilson Senior...	20-40	1975	5	Wauk.	4-5 x 6 1/2	G, K	4								
Farquhar...	15-25	.....	4	Buda	4-4 1/2 x 6	G, K, D	3-4	Oil Pull... K	12-20	1095	4	Own	2-6 x 8	K, D	3	ABBREVIATIONS: G—Gasoline. K—Kerosene. D—Distillate. Flow capacity varies in relation to operating conditions. Figures are based on 14 in. plows. Engine Make: Beav.—Beaver. Clim.—Climax. Cont.—Continental. Dom.—Domas. Evin.—Evinrude. Here.—Hercules. LeR.—Leroy. Midw.—Midwest. Nway.—New Way. Nor.—Northway. Strns.—Stearns. T.C.—Twin City. Wauk.—Waukesha. Weid.—Weidely. Wis.—Wisconsin. *—Crawler type. All others are wheel type. †Price includes plows. ‡Rodebilder.							
Farquhar...	18-35	.....	4	Own	4-6 x 8	G, K, D	4-5	Oil Pull... H	16-30	1750	4	Own	2-7 x 8 1/2	K, D	4								
Farquhar...	25-50	.....	4	Own	4-7 x 8	G, K, D	6-7	Oil Pull... C	20-40	2550	4	Own	2-8 x 10	K, D	5-6								
Fitch..... 4	20-35	4	Clim.	4-5 x 6 1/2	G or K	3-4	Oil Pull... E	30-60	3775	4	Own	2-10 1/2	K, D	8-10								
Fordson...	1-18	335	4	Own	4-4 x 5	G, K	2																



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Here is a shock absorber that stops Ford side sway and body roll. No disagreeable "tipping" feeling in a Drednaut equipped Ford. You can take the sharpest corners without the slightest discomfort. Drednauts will keep you on your seat. The strong Drednaut arm keeps the Ford body steady. This one exclusive feature alone is well worth the price you pay for Drednauts. Drednauts also absorb the shocks and jolts that shorten the life of your car. **Nothing interferes with the free action of the leaf springs—nothing works**

loose—nothing can drop off. Drednauts will outlast the car itself.

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DREDNAUT

SHOCK ABSORBERS FOR FORDS

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan	NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan		
Ace.....	F-G-B	4-3 1/2 x 5	114	32x4	\$1295	\$1295	.....	.....	\$2295	Marmon.....	34	Own.	6-3 1/2 x 5 1/2	136	32x4 1/2	\$3700	\$3700	\$4700	\$5150	
Ace.....	L-H-S	6-3 1/2 x 5	117	32x4	2260	2260	.....	.....	3680	Maxwell.....	Own.	4-3 1/2 x 4 1/2	109	31x4	885	885	1385	1485		
Ace.....	C Cont.	6-3 1/2 x 5 1/2	123	33x4 1/2	2975	2975	.....	.....	4500	McFarlan.....	1921	Own.	6-4 1/2 x 6	140	33x5	6300	6300	7500	7500	
Ambassador.....	R Cont.	6-3 1/2 x 5 1/2	136	33x5	.....	4500	4500	.....	6500	Mercer.....	Series 5	Own.	4-3 1/2 x 6 1/2	132	32x4 1/2	3950	3950	4850	5250	
American.....	C H-S	6-3 1/2 x 5	127	32x4	2195	2195	12250	.....	3150	Merit.....	Cont.	6-3 1/2 x 4 1/2	119	32x4	1895	1895	.....	.....	
Anderson.....	Series 40	Cont.	6-3 1/2 x 4 1/2	120	33x4	2195	1650	1795	\$2450	Metzger.....	R & RR	Dues.	4-4 1/2 x 6	129	32x4 1/2	5000	5000	7000	7000		
Apperson.....	8-21-S	Own.	8-3 1/2 x 5	130	34x4 1/2	.....	2620	2645	3625	Mitchell.....	F-50	Own.	6-3 1/2 x 5	120	33x4	1490	1490	2050	2275	
Auburn Beauty Six.....	6-51	Cont.	6-3 1/2 x 4 1/2	121	32x4	1575	1575	1615	2395	Mitchell.....	F-50	Own.	6-3 1/2 x 5	127	33x4	.....	1690	.....	.....
Auburn.....	Beauty Six	Cont.	6-3 1/2 x 4 1/2	121	32x4 1/2	.....	12195	.....	.....	Monroe.....	1922-S-13	Own.	4-3 1/2 x 4 1/2	115	32x3 1/2	875	875	.....	.....
Beggs.....	297	Cont.	6-3 1/2 x 4 1/2	120	33x4	1775	1520	.....	2320	2420	Moon.....	6-40	Cont.	6-3 1/2 x 4 1/2	115	31x4	1295	1295	.....	.....
Ball.....	6-50	H-S	6-3 1/2 x 5	124	32x4	1545	1545	.....	.....	.....	Moon.....	6-48	Cont.	6-3 1/2 x 4 1/2	122	32x4	1785	1785	2285	2785
Biddle.....	B1 & B5	Buda.	4-3 1/2 x 5 1/2	121	32x4	2950	12950	.....	3950	3950	Moon.....	6-68	Cont.	6-3 1/2 x 5 1/2	125	32x4 1/2	.....	2285	.....	.....
Brewster.....	91	Own.	4-4 1/2 x 5	125	32x4 1/2	6000	6000	.....	9200	.....	Murray-Mac Six.....	Own.	6-3 1/2 x 5 1/2	128	34x4 1/2	4250	4250	4250	.....	
Buick.....	1922-31-35-38-37	Own.	4-3 1/2 x 4 1/2	109	31x4	895	935	.....	1295	1395	Nash.....	691-96-97	Own.	6-3 1/2 x 5	121	33x4	1360	1390	1540	2090
Buick.....	1922-41-5-6-7	Own.	6-3 1/2 x 4 1/2	118	33x4 1/2	1365	1395	.....	1885	2165	Nash.....	692-94-95	Own.	6-3 1/2 x 5	127	34x4 1/2	.....	1540	2090	2390
Buick.....	1922-48-9-50	Own.	6-3 1/2 x 4 1/2	124	34x4 1/2	1785	.....	1585	2075	2375	Nash Four.....	41-4	Own.	4-3 1/2 x 5	112	33x4	965	985	1485	1645
Cadillac.....	61	Own.	8-3 1/2 x 5 1/2	132	33x5	3100	3150	3150	3925	4100	National.....	BB	Own.	6-3 1/2 x 5 1/2	130	32x4 1/2	2750	2750	3890	3990	
Case.....	X	Cont.	6-3 1/2 x 4 1/2	122	32x4 1/2	.....	1890	.....	2790	2990	Nema.....	3C	Bea.	6-3 1/2 x 4 1/2	128	32x4 1/2	2000	2200	3200	3200
Case.....	V	Cont.	6-3 1/2 x 5 1/2	126	34x4 1/2	.....	1935	2585	2990	2990	Nema.....	1D	Cont.	6-3 1/2 x 5 1/2	128	32x4 1/2	3000	3100	3200	5500
Chalmers.....	1922	Own.	6-3 1/2 x 4 1/2	117	32x4	1345	1395	1495	2095	2395	Norwalk.....	430-KS	Lyc.	4-3 1/2 x 5	116	32x3 1/2	.....	1035	.....	.....
Chalmers.....	1922	Own.	6-3 1/2 x 4 1/2	122	32x4	.....	1495	.....	.....	.....	Oakland.....	6-44	Own.	6-2 1/2 x 4 1/2	115	32x4	1120	1145	1265	1685
Champion.....	Tourist	Lyc.	4-3 1/2 x 5	113	32x3 1/2	.....	995	1995	.....	.....	Ogden.....	6 T De Luxe	Cont.	6-3 1/2 x 5 1/2	134	33x5	3750	3750	3850	4800
Champion.....	Special	H-S	4-3 1/2 x 5	118	32x4	1095	1095	.....	2295	2395	Oldsmobile.....	43-A	Own.	4-3 1/2 x 5 1/2	115	32x4	1145	1145	1645	1795
Chandler.....	Six	Own.	6-3 1/2 x 4 1/2	123	33x4	1595	1595	1695	2295	2395	Oldsmobile.....	46	Own.	8-2 1/2 x 4 1/2	122	33x4 1/2	1735	1735	2635	2635
Chevrolet.....	490	Own.	4-3 1/2 x 4	102	30x3 1/2	525	525	.....	875	875	Oldsmobile.....	47	Own.	8-2 1/2 x 4 1/2	115	32x4	1595	1595	2145	2295
Chevrolet.....	FB	Own.	6-3 1/2 x 5 1/2	110	32x4	975	975	.....	1575	1575	Overland.....	4	Own.	4-3 1/2 x 4	100	30x3 1/2	550	550	850	850
Cleveland.....	41	Own.	6-3 1/2 x 4 1/2	112	32x4	1175	1195	.....	1550	1595	Packard.....	Single-Six	Own.	6-3 1/2 x 4 1/2	116	33x4 1/2	2350	2350	3125	3350
Climber Four.....	K	H-S	4-3 1/2 x 5	115	33x4	1385	1385	.....	3000	3100	Packard.....	Twin Six	Own.	12-3 x 5	136	35x5	3850	3850	5240	5400
Climber Six.....	S	H-S	6-3 1/2 x 5 1/2	125 1/2	32x4 1/2	2250	2250	.....	3185	3685	Paige.....	6-44	Own.	6-3 1/2 x 5	119	32x4	1465	1465	1995	2245
Cole.....	890	Nort.	6-3 1/2 x 4 1/2	127 1/2	33x5	2485	2485	2485	1995	1995	Paige.....	6-66	Cont.	6-3 1/2 x 5	131	33x4 1/2	1245	1245	2195	3100	
Columbia Challenger.....	Rut.	6-3 1/2 x 5	115	32x4	1195	1195	1995	1995	2350	Paterson.....	22-6-52	Cont.	6-3 1/2 x 4 1/2	120	32x4 1/2	1550	1585	2595	2595
Columbia.....	D-C&CS	Cont.	6-3 1/2 x 4 1/2	115	32x4	1475	1475	1475	12295	2350	Peerless.....	56-S-7	Own.	8-3 1/2 x 5	125	34x4 1/2	1790	2790	3500	3790
Columbia.....	Light Six	Cont.	6-3 1/2 x 4 1/2	115	31x4	985	985	.....	1295	1395	Piedmont.....	4-30	Lyc.	4-3 1/2 x 5	116	32x3 1/2	.....	970	.....	.....
Comet.....	C-53	Cont.	6-3 1/2 x 5 1/2	125	33x4 1/2	.....	1985	2085	.....	2985	Piedmont.....	6-40	Cont.	6-3 1/2 x 4 1/2	122	32x4	1285	1285	.....	.....
Crawford.....	22-6-40	Cont.	6-3 1/2 x 5 1/2	122 1/2	32x4	3000	3000	3000	.....	4500	Pierce-Arrow.....	Own.	6-4 x 5 1/2	138	33x5	7000	6500	8000	8500	
Daniels.....	D-19	Own.	8-3 1/2 x 5 1/2	132	34x4 1/2	4350	4350	4350	5250	5950	Pilot.....	6-45	Teeter	6-3 1/2 x 5	120	32x4	1500	1500	.....	.....
Davis.....	71	Own.	6-3 1/2 x 4 1/2	114	31x4	.....	1195	.....	2095	2105	Pilot.....	6-50	H-S	6-3 1/2 x 5	126	32x4 1/2	2050	2000	2950	3000
Davis.....	61-67	Own.	6-3 1/2 x 4 1/2	120	33x4	1595	1595	11695	1545	1595	Porter.....	46	Own.	4-4 1/2 x 6 1/2	142	35x5	6750	6750	7800	7800	
Dixie Flyer.....	H-S-70	H-S	4-3 1/2 x 5	112	32x4	1095	1095	11295	1280	1440	Premier.....	6-D	Own.	6-3 1/2 x 5 1/2	126 1/2	33x5	3150	3100	3250	5100	
Dodge Brothers.....	Own.	4-3 1/2 x 4 1/2	114	32x4	850	880	.....	4785	5800	7190	Premocor.....	6-40	Falls	6-3 1/2 x 4 1/2	117	32x4	1095	1095	1750	1825
Dorris.....	6-80	Own.	6-4 x 5	132	33x5	.....	14785	4785	1065	1115	R & V Knight.....	R	Own.	4-3 1/2 x 5	116	32x4	.....	1665	2385	2475
Dort.....	19-14	D-Lyc.	4-3 1/2 x 5	108	31x4	865	865	.....	1275	1275	R & V Knight.....	J	Own.	6-3 1/2 x 5 1/2	127	32x4 1/2	2475	2475	3000	3105
Driggs.....	Own.	4-2 1/2 x 4 1/2	104	30x3 1/2	1275	1275	.....	7800	7800	8000	Reo Series.....	B-T & U6	Own.	6-3 1/2 x 5	120	33x4	1595	1595	2355	2435
Dussenberg.....	Straight 8	Own.	8-2 1/2 x 5	134	33x5	6500	6500	6750	3800	4090	Reo Ver.....	C	Dues.	4-4 1/2 x 6	131	32x4 1/2	3200	3200	3200	4000	
Du Pont.....	A	Own.	4-3 1/2 x 5 1/2	124	32x4 1/2	3000	3200	.....	1365	1365	Rickenbacker.....	A	Own.	6-3 1/2 x 4 1/2	117	32x4	1485	1485	1885	1985
Durand.....	A-22	Cont.	4-3 1/2 x 4 1/2	109	31x4	1380	890	.....	2250	2400	Romer.....	6-54-E	Cont.	6-3 1/2 x 5 1/2	128	32x4 1/2	2850	2285	2785	3850
Durand.....	B-22	Anst.	6-3 1/2 x 4 1/2	123	32x4 1/2	1600	1650	.....	.....	.....	Romer.....	4-75-E	Dues.	4-4 1/2 x 6	128	32x4 1/2	3985	3585	13750	14550
Earl.....	40	Own.	4-3 1/2 x 5 1/2	112	32x4	1485	995	.....	1695	1695	Rolls-Royce.....	Own.	6-4 1/2 x 4 1/2	143 1/2	33x5	.....	10,900	.....	.....
Elcar.....	K-4	Lyc.	6-3 1/2 x 4 1/2	118	33x4	1095	1095	11095	1345	1345	Romer.....	R-22	Cont.	6-3 1/2 x 4 1/2	120	32x4	1975	1975	2050	2700	
Elcar.....	T-R	Cont.	6-3 1/2 x 4 1/2	118	33x4	1395	1395	11395	2065	2165	Saxon.....	125	Own.	4-3 1/2 x 5	112	32x4	1195	1195	1795	1795	
Elgin.....	K-1	Falls	6-3 1/2 x 4 1/2	118	33x4	1345	1295	1345	2195	2195	Sayers Six.....	DP	Cont.	6-3 1/2 x 4 1/2	118	33x4	1695	1695	2795	2795	
Essex.....	Own.	4-3 1/2 x 5	108 1/2	32x4	1095	1095	.....	1345	1895	1895	Seneca.....	L & O	Lell.	4-3 1/2 x 4 1/2	108	30x3 1/2	845	845	.....	.....
Falcon, H.P.M.....	12-D22	Own.	4-2 1/2 x 4	100	27x3 1/2	2800	13000	.....	4000	4000	Seneca.....	50 & 51	Lyc.	4-3 1/2 x 5	112	31x4	1095	1095	.....	.....
Ferris.....	Series 60	Own.	6-3 1/2 x 5 1/2	130	32x4 1/2	2575	.....	2475	3475	3475	Southern Six.....	660-2	H-S	6-3 1/2 x 5	127	32x4 1/2	2375	2375	2395	2395
Ferris.....	Series 70	Own.	6-3 1/2 x 5 1/2	130	32x4 1/2	2895	.....	2795	3895	3895	Sperling, A.....	Supr.	4-3 1/2 x 5	114	32x4	980	980	1685	1685	
Ford.....	T	Own.	4-3 1/2 x 4	109	30x3 1/2	1319	1348	.....	580	645	Standard.....	Sterling	Own.	8-3 1/2 x 5	127	34x4 1/2	2500	2500	2750	3200
Franklin.....	9-B	Own.	6-3 1/2 x 4	115	32x4	2400	2450	.....	3200	3450	Stanley.....	Own.	2-4 x 5	130	34x4 1/2	2800	2600	3775	3850	
Gardner.....	T-R & G	Lyc.	4-3 1/2 x 5	117	32x3 1/2	895	895	.....	1595	1595	Stanwood Six.....	Cont.	6-3 1/2 x 4 1/2	118	33x4	1765	1765	.....	.....
Goodspeed.....	Own.	4-3 1/2 x 5 1/2	124	32x4 1/2	3985	3785	.....	1895	1945	1945	Star.....	Cont.	4-3 1/2 x 4 1/2	102	30x3 1/2	1319	1319	580	645	
Grant.....	Own.	6-3 1/2 x 4 1/2	116	32x4	1385	1385	.....	1895	1945	1945	Stearns Knight.....	SK14	Own.	4-3 1/2 x 5 1/2	125	34x4 1/2	2250	2450	3150	3450
Gray.....	Own.	4-3 1/2 x 4	100	30x3 1/2	.....	475	.....	.....	760	760	Stephens.....	90	Own.	6-3 1/2 x 4 1/2	122	33x4 1/2	1675	1745	2650	2650
H.C.S.....	Weid.	4-3 1/2 x 5 1																			